# APPENDIX 7
## DIRECT, INDIRECT, AND CUMULATIVE EFFECTS TO WATER RESOURCES BY PLAN

The notes below identify what is and is not analyzed in this appendix and the scale of that analysis for the Plans.

### Analysis Area for Water Resources

This appendix analyzes the direct and indirect impact to water resources for each Plan individually for Alternatives 2 and 3 only. The analysis areas are 10 acres or less and based on what the miner proposed to do. The analysis area is identified for each Plan. Direct and indirect impacts to water resources for Alternative 1 are found in Chapter 3, Table 3-11.

Cumulative effects to water resources are found in **Table 7-15** at the end of this appendix and summarized in Chapter 3. Chapter 3 evaluates the combined direct and indirect effects of all the Plans that occur within a subwatershed, and the potential cumulative effects between Plans and then at the downstream end of a subwatershed.

### Soils

The direct, indirect, and cumulative effects to soils from these operations are not addressed in this appendix but only in Chapter 3 because areas proposed for disturbance in the Plans are 10 acres or less and the operations are scattered throughout five subwatersheds. The cumulative effects on soil productivity are addressed at the subwatershed scale in the Soil Resource Cumulative Effects.

### Fords

Only fords on Forest Service closed or decommissioned roads or fords on existing or proposed temporary access roads were analyzed. Fords on open roads were NOT analyzed because they are used by the general public and there is no way to assess what if any potential impacts from use could be attributed to the miner and their mining operation.

### Suction Dredging

Eight Plans propose suction dredging which is permitted under ODEQ 700PM permit that allows for inchannel dredging of the channel bed (Appendix 4). For the purposes of the water resources analysis, the analysis area for suction dredging is limited to the Plan area boundary. The site characteristics presented under the suction dredging section for that Plan is therefore limited to this area. Analysis area for suction dredging is specified for this appendix because

the State of Oregon 700PM permit only asks the miner for a Township, Range and Section. The stream name and area within the stream is not identified and was not provided by the miners.

## Effects on Wetlands and Floodplains

Three operations (Belvadear, Blue Sky Bull Run, and Tetra Alpha) were identified as proposing some activity in either wetlands or floodplains. They are discussed for compliance with the following Executive Orders.

Executive Order 11988 (Protection of Floodplains) requires government agencies to take actions that reduce the risk of loss due to floods, to minimize the impact of floods on human health and welfare, and to restore and preserve the natural and beneficial values served by floodplains. Executive Order 11988 defines the term “floodplain” as follows: “…that area subject to a one percent or greater change of flooding in any given year.”

Executive Order 11990 (Protection of Wetlands) requires government agencies to take actions that “avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands.” EO 11990 (Sec 2 (a)(1 and 2) further states “shall avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is no practicable alternative to such constructions, and (2) that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use…” Executive Order 11990 defines wetlands and new construction as follows:

Wetlands: The term "wetlands" means those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.

New construction: The term "new construction" shall include draining, dredging, channelizing, filling, diking, impounding, and related activities and any structures or facilities begun or authorized after the effective date of this Order.

### PACFISH: Analysis of Riparian Management Objectives (RMOs)

Seven RMO parameters are identified in PACFISH (1995) that relate to streams. They are Pool Frequency, Water Temperature, Large Woody Debris, Substrate Sediment, Bank Stability, Lower Bank Angle, and Width/Depth ratio. Because the areas proposed for mining are all less than 10 acres, with most less than 5 acres, and the length of stream that they could potentially influence in all cases is less than 300 feet, the mining areas are considered points along the stream. As such, the RMO standards do not apply because the standards are designed to be

evaluated at the landscape scale rather than at a specific point along the stream. Therefore, the discussions below examine the potential for local changes to the RMO parameters as a result of the various activities proposed in the Plans, NOT the RMO standards.

## Other Potential Water Resource Impacts

Ten Plans propose activities that have the potential to impact water resources in unique ways. Belvadear, Eddy Shipman, Hopeful 1, Lightning, Make It, Olive Tone, Tetra Alpha Placer, Tetra Group propose to withdraw water from a creek. Grubsteak proposes to dig a test hole that could reverse groundwater flow directions and Muffin proposes to dig at the edge of a wetland. Potential impacts to water resources from these activities are evaluated under this header.

Water withdrawals and groundwater flow reversal have the potential to alter stream temperatures on streams that already exceed ODEQ standards. In addition, the project area streams fall under the *John Day River Basin Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP) (ODEQ 2010).* "The WQMP identifies the National Forests as Designated Management agencies (DMA) with responsibilities for implementing the TMDL within their jurisdiction (ODEQ, written comm. Nov. 23, 2010)."

The TMDL calls for all feasible steps toward flow restoration and protection (J. Dadoly, pers. communication, 8/20/2014). The principle causes of stream heating in the basin are near-stream vegetation removal, channel reconfiguration, and instream flow loss (ODEQ 2010). Therefore, compliance with the TMDL is identified in this appendix as well as in Chapter 3 of the DEIS, Water Resources section.

> The *John Day River Basin Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP)* is hereafter referred to as the John Day Basin TMDL.

## Reclamation Activity post mining

Most Plans have proposed reclamation activities post mining activities. Under Alternative 2, some of the reclamation activities have the potential for a discharge because there insufficient water resource protection measures were identified to prevent a discharge of sediment. Under Alternative 3, the potential for a discharge related to reclamation activities would be eliminated as a result of the addition of Forest Service General Requirements (**Appendix 2).**

## Cumulative Effects Analysis

The cumulative effects analysis for water resources for each Plan is found in **Table 7-15** at the end of Appendix 7.

# Altona

**Plan type:** Placer
**Subwatershed:** Beaver Creek (HUC 170702020203)
**Subwatershed size:** 13,075 acres
**Analysis area:** 5 acres
**Creek:** Quartz Gulch (intermittent flow and non fish-bearing)
**Stream Order:** 1st order
**303(d) listed:** N/A
**Suction Dredging:** No
**Essential Salmon Habitat**: No

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

Potential for a discharge because the description of the miner-proposed buffer zone is not specific enough to determine its effectiveness in preventing a discharge of sediment into Quartz Gulch. The area has been hydraulically mined in the past. Mining activity would occur up on a terrace above the Quartz Gulch. The terrace has a 5-foot bank height. The miner proposes a 20-foot buffer from the stream. Quartz Gulch is seasonally diverted into Pete Mann ditch.

Depending on the starting point the miner intended to use when measuring 20 feet from the creek, there "may" or "may not" be a potential for a discharge. As a result of this uncertainty, the worst-case scenario was used is assessing potential water quality impacts (**Appendix 1B, Figure 3, Point A**). In scenario A, there would be the potential for a discharge of sediment into the gulch.

Ponds

*Source water pond and Settling ponds*

The potential for a discharge or other impacts to water resources due to construction and use of the proposed settling and source water ponds **could not be evaluated** because the miner could not find the adit which was to be the source of the water for the ponds.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Miner proposes to use three unusable Forest Service closed roads (1305-092, 098, and 099), one unusable open Forest Service (1305-080) road due to a washout, three existing temporary access (TA) roads and one proposed temporary access road (Appendix 6). All would require considerable work to make them usable. Several have portions that cross drainages. Use of these roads is not required to access the site and these roads are NOT discussed further.

The roads evaluated for potential effects to water resources are (TA) roads1042-E1a and 1042-E1b and proposed mine access road1042-M1a.

*Existing TA roads*

No potential for a discharge as a result of using the existing TA roads because they are more than 125 feet from the drainage and there is sufficient ground cover to trap any sediment that leaves the roads prior to reaching the drainage. See Appendix 3 for details.

*Proposed TA road 1042-M1a*

No potential for a discharge as a result of using the proposed TA road because it is more than 125 feet from the drainage and there is sufficient ground cover to trap any sediment that leaves the roads prior to reaching the drainage. See Appendix 3 for details.

**Clean Water Act, Section 303(d)** (antidegradation)

Quartz Gulch is not 303(d) listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) two existing temporary access roads and 2) the proposed temporary access road. The source water pond could not be evaluated because the miner could not find the adit, which was to be the water source.

Ponds

The proposed source water and settling ponds **could not be evaluated** for compliance with MM-2 under Alternative 2 because the miner could not locate the adit which was to supply the water for the ponds.

Access roads

*Existing TA roads*

Use of the existing TA roads would be in compliance with MM-2 because no impacts water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*Proposed TA road 1042-M1a*

Construction and use of the proposed TA road would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* No changes in *Pool Frequency* because 1) the potential inputs of fine sediment would be small and move through the system as suspended load, 2) no changes to large woody recruitment are expected (see below), and 3) no suction dredging is proposed.

*Water Temperature*: No changes in *Water Temperature* because 1) there would be no activity in the channel or on the stream banks which would alter channel width and therefore change flow depths for a given discharge, and 2) there would be only very limited removal of trees, none of which would be shade trees.

*Large Woody Debris:* No changes in *Large Woody Debris* recruitment or existing wood in the stream because 1) the only place where trees would be cut is in the spur road/skid trail so that potential LWD recruitment would not be affected, and 2) there would be no activity in the channel to alter existing amounts.

*Substrate Sediment:* No changes in *Substrate Sediment* because 1) no suction dredging is proposed, 2) no other inchannel activity is proposed, and 3) the potential inputs of fine sediment would be small and would move through the system as suspended load and not alter substrate.

*Bank Stability*: No changes in *Bank Stability* because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* because there would be 1) no change to *Bank Stability* and 2) no instream activity which could trigger a headcut.

**Wetlands and Floodplains**

No activity is proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# ALTERNATIVE 3
# Water Resources
## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

Different from Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** with the addition of the Forest Service WRPM (Water Resource Protection Measure) (Appendix 1A) which clarifies the starting point of the buffer width measurement and requires a barrier of the straw bales/coils between the activity and the stream. The WRPM, which clarifies the Plan-specific buffer, results in the mining activities clearly on the terrace and back 20 feet from the terrace edge. Therefore, there would be sufficient sediment trapping mechanisms in place (distance and straw bales/coils) to prevent sediment from reaching the creek.

Ponds

*Source water pond*

Same as Alternative 2. Not evaluated because the water source (the adit) could not be located.

*Settling ponds*

Same as Alternative 2. Not evaluated because the miner could not find the adit which was to be the source of the water for the ponds.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No discharge potential from use of the two existing TA roads or construction and use of the proposed TA road. See Appendix 3 for detailed discussion.

**Clean Water Act, Section 303(d)** (antidegradation)

Quartz Gulch is not 303(d) listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) two existing temporary access roads and 2) the proposed temporary access road. The source water pond could not be evaluated because the miner could not find the adit which was to be the water source.

Ponds

Same as Alternative 2. The ponds could not be evaluated due to the lack of information on location. See Appendix 3 for detailed discussion.

Access Roads

Same as Alternative 2. The TA roads would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. None of the RMO parameters would be affected.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

## Other Potential Water Resource Impacts

None

# Belvadear

**Plan type**: Placer
**Subwatershed:** Beaver Creek (HUC 170702020203)
**Subwatershed size:** 13,075 acres
**Analysis area:** 3 acres
**Creek**: Olive Creek (perennial flow and fish-bearing)
**Stream Order:** 2nd
**303(d) listed:** No
**Suction Dredging:** No
**Essential Salmon Habitat:** Yes

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

Potential for a discharge via subsurface flow of sediment generated by mining in the riparian area into Olive Creek through the narrow berm which separates the area to be mined and Olive Creek. The berm is composed of old placer tailings and flow was observed entering the creek through the berm at two points indicting connection between the creek and the proposed mining area.

Ponds

*Source water pond and Settling pond*

The source water pond and the settling pond are the same pond. Water for the source water pond would be withdrawn from Olive Creek and a spring.

No potential for a discharge via surface or subsurface flow from the existing pond into Olive Creek because the pond is dug into the ground and has silt coating the pond bed, indicating effective trapping of fine sediment. See Appendix 3 for detailed discussion.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Miner proposes to use one existing TA road to access the (Appendix 6). It is a native surface road and 0.15 miles long.

No potential for a discharge as a result of using the existing TA road because the road is separated from Olive Creek by about 25 feet of flat ground and a berm. The flat ground and the berm would trap any sediment that leaves the road prior to it reaching the creek. See Appendix 3 for details

**Clean Water Act, Section 303(d)** (antidegradation)

Olive Creek is not 303(d) listed.

**Suction Dredging**

None proposed

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the proposed mining operation that are evaluated for compliance with MM-2 are 1) an existing pond used as both source water and as a settling pond and 2) one existing TA road. Both structures are inside the RHCA of Olive Creek.

Ponds

Use of the pond would be in compliance with MM-2 because no impacts water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Access Roads

Use of TA road 1305-E2 would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency*: No changes in Pool Frequency as a result of the proposed activities for the following reasons: 1) The potential inputs of fine sediment under Alternative 2 would be small and move through the system as suspended load, 2) no changes to large woody recruitment are expected (see below), and 3) no suction dredging is proposed.

*Water Temperature*: No changes in Water Temperature because 1) there would be no activity in the channel or on the stream banks which would alter channel width and therefore change flow depths for a given discharge, and 2) there would be only very limited removal of trees and none would be shade trees.

*Large Woody Debris*: No changes in Large Woody Debris recruitment or existing wood in the stream because 1) only limited removal is proposed and none of it near the stream so that potential LWD recruitment would not be affected, and 2) there would be no activity in the channel to alter existing amounts.

*Substrate Sediment:* No changes in *Substrate Sediment* because 1) no suction dredging is proposed, 2) no other inchannel activity is proposed, and 3) the potential inputs of fine sediment would be small and would move through the system as suspended load and not alter substrate.

*Bank Stability*: No changes in Bank Stability because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle*: No changes in Lower Bank Angle for the same reasons listed under Bank Stability.

*Width/Depth ratio*: No changes in Width/Depth ratio because there would be 1) no change to Bank Stability and therefore no increase in channel width and 2) no instream activity which could trigger a headcut and increase channel depths.

**Wetlands and Floodplains**

Mining activity is proposed in the wetlands that have developed between the berm and the road in the old placer tailings. The Plan would NOT be in compliance with Executive Order 11990 because the miner has not clearly defined what he proposes to do to “minimize harm to the wetlands” and ensure restoration of their function once mining activity is completed. Executive Order 11988 (Protection of Floodplains) does not apply because the Plan does not propose any activity in floodplains.

**Other Potential Water Resource Impacts**

<u>Stream flow and stream temperature alteration related to water withdrawals</u>

The Belvadear miner proposes to withdraw water from a spring and Olive Creek to use as source water for processing placer material. Based on the pump size (10 HP 3" pump), the pump would withdraw approximately 100 gallons per minute or 0.2 cfs. This is the amount assumed to be withdrawn from Olive Creek and all the water came from Olive Creek, and is what is analyzed below for effects.

*Background*

The potential effects of withdrawing water from Olive Creek on stream flow and stream temperatures were assessed using 1) stream temperature data, 2) water depths taken when installing and retrieving stream temperature monitors (hobos), 3) a stream flow measurement from July 19, 2013, and 4) examination of several stream gages from the larger area to determine the timing of summer low flows which are solely the result of groundwater inputs.

a. Stream Temperatures

There are two stream temperature monitors (hobos) on Olive Creek. Hobo Olive.93L.1 is downstream of the confluence of McWillis Gulch and Olive Creek and hobo Olive.93L.2 is upstream of the confluence of Quartz Gulch and Olive Creek. McWillis Gulch does not contribute flow during the summer to Olive Creek but Quartz Gulch, upstream of McWillis Gulch, does contribute flow to Olive Creek.

Hobo Olive.93L.2 is located between Olive Tone and Belvadear Placers. The ODEQ stream temperature standard for Olive Creek is 53.6*F. The 7-day running average of the maximum daily stream temperatures for the years with data exceed ODEQ standard at both sites most years (**Table 7-1**).

**Table 7-1**
**7-day running average of the maximum daily stream temperature on Olive Creek in the vicinity of Belvadear**

| 2010 NHD HUC 12 name | 2010 NHD HUC 12 | Creek | Hobo number | Survey Year | District Av. 7 day | Elevation (ft) |
|---|---|---|---|---|---|---|
| Beaver Creek | 170702020203 | Olive | Olive.93L.1 | 1995 | 56.42 | 5181 |
| Beaver Creek | 170702020203 | Olive | Olive.93L.1 | 1996 | 57.1 | 5181 |
| Beaver Creek | 170702020203 | Olive | Olive.93L.1 | 2006 | 55.77 | 5181 |
| Beaver Creek | 170702020203 | Olive | Olive.93L.1 | 2008 | 56.3 | 5181 |
| | | | | | | |
| Beaver Creek | 170702020203 | Olive | Olive.93L.2 | 1996 | 55.9 | 5266 |
| Beaver Creek | 170702020203 | Olive | Olive.93L.2 | 2006 | 53.09 | 5266 |
| Beaver Creek | 170702020203 | Olive | Olive.93L.2 | 2008 | 55.7 | 5266 |

b. Water Depths

Hobo Olive.93L.2 is located between the Belvadear and Olive Tone operations. Water at the time of installation and removal at the site were 12.4 inches or less, and in most cases 6 inches or less (**Table 7-2**). Upstream of this hobo, but downstream of the Olive Tone operation, Olive Creek has been observed to go dry (C. Helberg, UNF Minerals Administrator, pers. com. 2014).

Maximum water depths were measured at hobo Olive.93L.1, located downstream of McWillis Gulch, on October 13, 2006. The water depth was measured every 10 feet for 100 feet, starting at the hobo site and heading upstream. Values ranged from 3.5 to 4 inches deep. The reduction in water depths in **Table 7-2** indicate that flows had decreased over the course of the summer months.

**Table 7-2**
**Water depths at hobo site Olive.93L.2, located upstream of Belvadear, at installation and removal**

| Year | Water depth at installation (inches) | Water depth at removal (inches) | Installation Date | Removal Date |
|---|---|---|---|---|
| 1999 | 6 | 3 | June 2 | Sept 7 |
| 2000 | 5 | 2 | May 15 | Sept 14 |
| 2006 | 12 | 4 | July 11 | Oct 13 |
| 2008 | 12.4 | 11.4 | Jul 4 | Oct 16 |

c. Stream Flow

There are no stream gages on Olive Creek. Therefore, stream hydrographs from six stream gages around the area were examined for the period of June 10 through Sept 30 for 2007 and 2013 to look for patterns of flow (*project file)*. Drainage areas for these stream gages ranged from 7 sq. miles up to 121 sq. miles.

Year 2007 was selected because flows were very low on the NFBR, which is the closest stream gage to Olive Creek and therefore expected to reflect the similar climate conditions, and 2013 because this was the year that the point-in-time stream flow measurement was made on Olive Creek. The stream hydrographs were examined to determine when stream flows were reflecting groundwater inputs only (base flows) and would therefore be at their lowest. While there was some variability between years and stations, stream low flows tend to occur between early to mid-July through early to late September. Therefore, any water withdrawals during this time would be occurring when the flows would be at their lowest.

Predictions regarding climate change for the Blue Mountains are for increased periods of drought, reductions in snowpacks, and a shift in the timing of peak flows to earlier in the year (Luce et al 2013; Science Briefing 2014). Under these conditions, stream flows are expected to decrease during the summer months, the initiation of summer low flows may occur sooner (i.e. from early-mid July to sometime in June), and stream temperatures may increase. An additional impact is that some streams may change from perennial to intermittent flow.

A point-in-time (instantaneous) stream flow measurement was made on July 19, 2013 by Umatilla Forest personnel about 1.5 miles downstream of the proposed activity area. The stream flow was 1.414 cfs with water depths ranging from 2 to 9.5 inches. This flow

measurement included water from Quartz Gulch and Buck Gulch and therefore would be larger than the flow at the Belvadear site which is located just upstream of Quartz Gulch. However, using the discharge of 1.414 cfs, the amount proposed for removal by the miner (0.2 cfs) would be 14 percent of the flow. In a drought year or with extended drought, summer low flows are expected to be less, making the amount withdrawn (0.2 cfs) a greater percentage of the total flow.

*Conclusions*

The available data show that currently stream depths and flows are low in the summer and stream temperatures exceed the ODEQ standard. Therefore, the miner's proposal to withdraw up to 0.2 cfs during the summer has the potential to 1) increase stream temperatures downstream, 2) decrease water depths downstream, and/or 3) dry up the stream below the operation. The magnitude of the impact would vary as a function of climate and flow conditions that year and prior years. Based on the above analysis, the water withdrawal has the potential to alter stream temperatures. Therefore, the Plan would not be in compliance with the John Day Basin TMDL (ODEQ 2010).

# ALTERNATIVE 3
## Water Resources
### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

The potential for a discharge remains. No additional protection measures could be identified that would prevent a discharge because the discharge determination is based on the location of the mining activity, the proposed activity, and the characteristics of the berm.

Ponds

*Source water pond and Settling pond (same pond)*

Same as Alternative 2. No discharge potential.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No discharge potential.

**Clean Water Act, Section 303(d)** (antidegradation)

Olive Creek is not 303(d) listed.

**Suction Dredging**

None proposed

**PACFISH: MM-2 (structures inside RHCAs)**

Ponds

Same as Alternative 2. Use of the existing pond as a source water and as a settling pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Access Roads

Same as Alternative 2. Use of the existing TA road would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. None of the RMO parameters would be affected.

**Wetlands and Floodplains**

Different than Alternative 2. Under Alternative 3, the Plan would be in compliance with Executive Order 11990 as a result of the addition of Forest Service General Requirements W1-3 (Appendix 2) that address mining in wetlands and wetland reclamation. These Forest Service requirements would "minimize harm to the wetlands" and ensure restoration of their function to the extent possible once mining activity is completed.

Same as Alternative 2. Executive Order 11988 (Protection of Floodplains) does not apply because the miner does not propose any activity in floodplains.

**Other Potential Water Resource Potential Impacts**

Stream flow and stream temperature alteration related to water withdrawals

Same as Alternative 2. The water withdrawal has the potential to alter stream temperatures. Therefore, the Plan would not be in compliance with the John Day Basin TMDL (ODEQ 2010).

# Blue Sky Bull Run

**Plan type**: Placer
**Subwatershed:** Bull Run Creek (HUC 170702020202)
**Subwatershed size:** 19,398 acres
**Analysis area:** 1.7 acres
**Creek**: Bull Run Creek (perennial flow and fish-bearing); Swamp Creek (mix: perennial-fish bearing in the meadow area to where it connects with Bull Run Creek and intermittent flow and non-fish-bearing in area of ford, which is upstream of meadow area)
**Stream Order:** Bull Run = 3rd or 4th depending on the mining site; Swamp Creek = 2nd
**303(d) listed:** Yes for sedimentation
**Suction Dredging:** Yes
**Essential Salmon Habitat:** Bull Run Creek = Yes. Swamp Creek = No

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Blue Sky site #1*

No potential for a discharge of any pollutants from mining at this site because the site is separated from Bull Run Creek by more than 100 feet and the ground in between is stable tailings covered with lodgepole. The area slopes gently and then flattens as it approaches Bull Run Creek and becomes a meadow. The site is adjacent to Swamp Creek, which seasonally has flow and is connected to Bull Run Creek via a channel. However, tailings line Swamp Creek and would prevent any sediment from entering the creek.

*Blue Sky site #2*

Potential for a discharge of sediment via surface flow into Swamp Creek because the activity area is 16 feet from the creek and is separated from the creek only by a low berm which is not continuous.

*Blue Sky site #3*

Potential for a discharge of sediment into Bull Run Creek via surface flow for two reasons: 1) mining activity on the valley floor and in the side channel and 2) the description where the

measurement of the miner-proposed 30 foot buffer starts is ambiguous and therefore the effectiveness of the buffer is uncertain.

1. Valley bottom width where mining is proposed is less than 27 feet from the side channel bank to the hillslope, and is either the active floodplain or the 5 year floodplain. Therefore mining activity and the accompanying soil disturbance has a high potential to enter Bull Run Creek during high flow.

2. Depending on the starting point the miner intended to use, there "may" or "may not" be the potential for a discharge of pollutants into Bull Run Creek.

a) If buffer distance is measured from the low-flow channel then it could put the mining activity on the valley floor and in close proximity to Bull Run Creek.

b) If buffer distance is measured from the valley floor-channel break in slope then the mining area would be up on the gentle hillslope. The ground cover between the mining area and the creek is well vegetated and thus would provide effective sediment trapping.

As a result of this uncertainty in mining location, the worst-case scenario was used and assumes activity on the flat valley floor near the creek. In addition to sediment generated by mining on the valley floor reaching the stream, there is also the potential for the test hole activity to trigger bank failure which may result in a large volume of sediment entering the creek. Therefore, under the worst case scenario, there would be the potential for a discharge of sediment into Bull Run Creek via surface flow.

*Blue Sky site #4*

Potential for a discharge because the description where the measurement of the miner-proposed 30 foot buffer starts is ambiguous and therefore the effectiveness of the buffer is uncertain. Depending on the starting point the miner intended to use, there "may" or "may not" be the potential for a discharge of pollutants into Bull Run Creek.

a) If buffer distance is measured from the low-flow channel then it could put the mining activity on the valley floor and in close proximity to Bull Run Creek.

b) If buffer distance is measured from the valley floor-channel break in slope then the mining area would be up on the gentle hillslope. The ground cover between the mining area and the creek is well vegetated and thus would provide effective sediment trapping.

As a result of this uncertainty in mining location, the worst-case scenario was used and assumes activity on the flat valley floor near the creek. In addition to sediment generated by mining on the valley floor reaching the stream, there is also the potential for the test hole activity to trigger bank failure which may result in a large volume of sediment entering the creek.

Therefore, under the worst case scenario, there would be the potential for a discharge of sediment into Bull Run Creek via surface flow.

*Bull Run site #1*

Potential for a discharge because the description where the measurement of the miner-proposed 30 foot buffer starts is ambiguous and therefore the effectiveness of the buffer is uncertain. Depending on the starting point the miner intended to use, there "may" or "may not" be the potential for a discharge of pollutants into Bull Run Creek.

a) If the buffer distance is measured from the low-flow channel then it could put the mining activity on the valley floor and in close proximity to Bull Run Creek.

b) If the buffer distance is measured from the valley floor-channel break in slope then the mining area would be up on the gentle hillslope. The ground cover between the mining area and the creek is well vegetated and thus would provide effective sediment trapping.

As a result of the uncertainty in mining location, the worst-case scenario was used which may result in some activity on the flat valley floor close enough to the edge of the channel bank to trigger bank failure as a result of digging the test holes. This may result in a large volume of sediment entering the creek.

*Bull Run site #2*

No potential for a discharge of any pollutants related to mining activity because the activity is located 45 feet from the creek, the ground is flat and well vegetated and the sediment trapping capability is very high.

Ponds

*Source water pond*

No potential for a discharge via surface or subsurface flow because water would be withdrawn from only an existing pond.

*Settling ponds*

No potential for a discharge via surface or subsurface flow from the settling ponds into either Swamp or Bull Run Creeks because 1) the ponds are old dredge ponds and are capable of holding volumes of water much greater then proposed by the operation and, and 2) the pond bottoms are vegetated with lush grasses, rushes and sedges which are effective at trapping fine sediment. See Appendix 3 for detailed discussion.

Fords

There are two existing fords. One ford is across Bull Run Creek and the other is across Swamp Creek. The existing Bull Run Creek ford across Bull Run Creek is used by the public to access two dispersed camp sites via a non-system road which has been given a temporary access road identifier of 7300-E4a for this analysis. This ford would also be used by the miner.

The existing Swamp Creek ford would be accessed via temporary access road 7300-E4b. The Swamp Creek ford would be used for heavy equipment and trucks. The existing wooden bridge that crosses Swamp Creek would be used for ATVs. The area of Swamp Creek where the ford exists has been impacted by past mining and has only intermittent flow. This portion of the channel is expected to by dry by early to mid-June given the characteristics of the channel bed (coarse cobbles and past mining activity).

*Bull Run Creek ford*

No potential for a discharge because the ford is already hardened and the channel bed is stable.

*Swamp Creek ford*

Potential for a discharge of sediment from use of this ford because the stream banks are vertical and would be eroded into the creek during use.

Bridges

*Existing bridge*

In addition to the Swamp Creek ford discussed above, there is also an existing wooden bridge across the creek that would be used by ATVs to access the processing site and mining site 1. No potential for a discharge of sediment as a result of use because it is stable and would only be used by ATVs. Heavy equipment would be transported across Swamp Creek via the ford.

*Proposed temporary bridge*

The temporary bridge would be used to access Bull Run site #2 and would cross Bull Run Creek. This bridge exists ONLY under Alternative 2.

Potential for a discharge of sediment into Bull Run Creek as a result of placement of the temporary bridge because some disturbance of the stream banks is anticipated that may result in sediment entering the creek.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Miner proposes to use four existing and three proposed temporary access roads to access the various sites (Appendix 6). All of these access roads are separated from Bull Run Creek by flat, well-vegetated ground. Distance between the creek and the roads vary from 90 to more than 200 feet. All of the roads are inside the RHCAs of Bull Run Creek and Swamp Creek.

*TA 7300-E4a, E4b, E4c and 7300-Ma1 (existing)*

No potential for a discharge related to use of these roads because there is sufficient distance and ground cover to trap any sediment that might leave these roads. See Appendix 3 for detailed discussion.

*TA 7300-M4a and M4b (proposed)*

Potential for a discharge because the roads would be close to the streams in order to access the sites, but the road locations have not yet been identified . See Appendix 3 for detailed discussion.

**Clean Water Act, Section 303(d)** (antidegradation)

Bull Run Creek is 303(d) listed for sedimentation by ODEQ. Sedimentation is defined by ODEQ as: “The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry….”

The activities proposed in this Plan would maintain the water quality condition for which this stream is listed for the following reasons. There would be no potential for increased sedimentation from the proposed activities (including suction dredging) despite the potential inputs of fine sediment due to mining-related activities on land because the sediment would move through the system as suspended load and not settle out on the channel bed. With respect to suction dredging, no new sediment would be added into the stream, but simply loosened and redistributed downstream during the spring high flows. The changes in substrate would be permanent but highly localized and restricted to the areas that are suction dredged.

**Suction Dredging**

Suction dredging is permitted under the ODEQ 700PM permit (Appendix 4A). This permit has a series of requirements for dredging in any stream with additional requirements for dredging in essential salmon habitat. Bull Run Creek is essential salmon habitat and therefore all aspects of the existing 700PM permit apply. While Bull Run Creek is 303d listed for sediment, suction dredging is grandfathered in on Bull Run Creek under Schedule C.19.

In evaluating suction dredging on Bull Run Creek in the area of the proposed operation, impacts to the following parameters were considered: pool frequency and distribution, habitat complexity (e.g. log jams, instream wood, beaver dams), stream temperatures, turbidity, and substrate, and channel bed stability (Appendix 4B, 4C). The analysis assumes that the miners would be in compliance with the 700PM permit (Appendix 4A) and all its requirements.

Site Characteristics

The channel bed in this area is predominantly cobbles with some gravels and sands and highly stable given the abundance of cobbles. Bull Run Creek was historically placer mined and therefore, the percentage of the silts and clays in the channel bed is expected to be limited. The only source of abundant fine-grained material would be the stream banks. However, no mining or destabilizing of the stream banks is permitted under the 700PM permit (Schedule C.5, 6, 7 and 8).

Water Quality and Channel Morphology analysis

*Pool frequency and distribution:* Localized changes in pool frequency and locations related to suction dredging as dredging will create pools and loosen the substrate. The pool created by suction dredging is likely to be permanent because the amount of bedload moving through the stream is limited and the sediment disturbed by suction dredging would be redistributed downstream during high flow events.

*Habitat complexity*: Potential local change to habitat complexity because boulders and habitat structures may be moved around in the stream but not removed. Therefore, the impacts of suction dredging on in-channel habitat complexity may occur but should be limited to small areas. The changes would be permanent.

Schedule C.6 prohibits removing or disturbing boulders, rooted vegetation, or embedded woody plants and other habitat structures from the stream banks. Habitat connected to the stream banks (beaver dams, undercuts, root wads etc.) therefore would remain intact thereby ensuring that some key habitat types would not be modified.

*Stream temperatures*: No changes to stream temperatures because suction dredging would not alter stream channel widths, channel depths, remove stream side shade or alter groundwater flows.

*Turbidity*: Local change on water clarity as represented by changes in turbidity. Turbidity could extend beyond the immediate area that is dredged but changes in water clarity are not allowed under the 700 PM permit to extend beyond 300 feet downstream. However, given the past history of placer mining in this stream, fines are expected to be limited in the channel bed and therefore the turbidity plume is expected to dissipate much sooner than 300 feet downstream. In addition, the turbidity plume would only occur when dredging is occurring. Therefore, the temporal impact is limited to the when the miner is suction dredging.

*Substrate:* Local changes in channel bed substrate are expected as a result of suction dredging. Dredging would pull sediment from the channel bed, pass it up through a suction hose, and run it across a recovery system (sluice box) floating at the surface. The gravel and other material, which washes through the recovery system, would then be washed back into the stream. Pools would be created where the sediment was pulled from and small dredge tailings piles created where the gravel and other material was deposited. In some cases the gravel and other material would be put back into the pool and in other cases deposited in the channel but not in the pool. These dredge tailings would be mobilized during the spring high flow and redistributed downstream. The changes in substrate at the dredge pool location would be permanent but highly localized.

*Channel bed stability*: No changes to channel bed stability even through dredging will create pools because the channel bed is composed of cobbles, sand and gravel. Therefore, no headcutting and bed destabilization is expected to occur.

Summary of Effects

The analysis found that suction dredging would have no impact on 1) stream temperature or 2) channel bed stability for the reasons stated above. Suction dredging would have a local impact on 1) pool frequency and distribution, 2) habitat complexity, 3) turbidity and 4) substrate for the reasons stated above. The changes to pool frequency, habitat complexity and substrate are expected to be permanent but limited to the area worked and therefore would not have a measurable impact on channel complexity or channel stability. Changes in turbidity would impact less than 300 feet of stream and not be permanent but limited to the period of time that the miner is suction dredging.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) existing source water pond, 2) existing settling ponds, 3) existing temporary access roads, 4) the proposed temporary access roads, 5) an existing bridge, and 6) a proposed temporary bridge.

Ponds

*Source water pond*

Use of the existing source water pond would be would be in compliance with MM-2 because the miner proposes to only withdraw water. Therefore, no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation.

*Settling ponds*

Use of the existing settling ponds would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*Access Roads*

*Existing TA roads*

Use of the existing TA roads would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*Proposed TA roads (except TA 7375-M1b)*

Construction and use of the proposed TA roads would NOT be in compliance with MM-2 because there is the potential for impacts to water quality, soils and riparian vegetation. See Appendix 3 for detailed discussion.

*Proposed TA 7375-M1b*

N/A. This road exists only under Alternative 3. It is instead of the proposed temporary bridge proposed under Alternative 2.

Bridges

*Existing bridge*

The existing wooden bridge would be in compliance with MM-2 because there is no potential for impacts to water quality, soils and riparian vegetation. See Appendix 3 for detailed discussion.

*Proposed temporary bridge*

The proposed bridge would NOT be in compliance with MM-2 because there is the potential for impacts to water quality, soils and riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* Localized changes in pool locations and frequency related to suction dredging would occur because dredging would create pools and loosen the substrate. The pool created by suction dredging is likely to be permanent because the amount of bedload moving through the stream is limited and the sediment disturbed by suction dredging would be redistributed downstream during high flow events.

No changes would occur to pool frequency related to potential for inputs of fine sediment from mining activity because inputs would move through the system as suspended load and not settle out in the pools. There would be no changes in pool frequency related to *Large Woody Debris* recruitment because no trees are proposed for removal.

*Water Temperature:* No changes in *Water Temperature* because 1) there would be only very limited removal of trees, none of which would be shade trees and 2) suction dredging would occur under the requirements established in the ODEQ 700 PM permit which would ensure that there would be no increase in stream channel widths or channel depths which would alter water depths and influence stream temperatures (Appendix 4A).

*Large Woody Debris:* No changes in *Large Woody Debris* recruitment or existing wood in the stream because 1) no trees are proposed for removal and 2) suction dredging would occur under the requirements established in the ODEQ 700 PM permit. Schedule C.6, 7, and 8 of the permit limits the amount of instream habitat structures that can be moved or altered (Appendix 4A).

*Substrate:* Local changes in channel bed substrate are expected as a result of suction dredging. Dredging would pull sediment from the channel bed, pass it up through a suction hose, and run it across a recovery system (sluice box) floating at the surface. The gravel and other material, which washes through the recovery system, would then be washed back into the stream. Pools would be created where the sediment was pulled from and small dredge tailings piles created where the gravel and other material was deposited. In some cases the gravel and other material would be put back into the pool and in other cases deposited in the channel but not in the pool. These dredge tailings would be mobilized during the spring high flow and redistributed downstream. The changes in substrate at the dredge pool location would be permanent but highly localized.

No changes would occur to substrate sediment as a result of potential for inputs of fine sediment related to mining activity because inputs would move through the system as suspended load.

*Bank Stability:* No changes in *Bank Stability* because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* because there would be 1) no change to *Bank Stability* and 2) suction dredging would occur under the requirements established in the ODEQ 700 PM permit (Appendix 4A) which prevent dredging of the stream banks and altering stream channel widths. With respect to changes in channel depths, the channel bed

composition is a mix of cobbles, sands and gravels and highly stable. Therefore, there would be no potential for suction dredging to trigger a headcut and increase channel depths.

**Wetlands and Floodplains**

Mining activity is proposed in the active to 5 year floodplain at Blue Sky site #3. The Plan would NOT be in compliance with Executive Order 11988 (Protection of Floodplains) because the miner has not ensured that mining in this area would not have impacts beyond a season as it pertains to floodplain function. Because vegetation would be removed during mining, there is potential for the spring high flows to erode some of the material mined and create a new channel in the floodplain.

Executive Order 11990 (Protection of Wetlands) does not apply because the Plan does not propose any activity in floodplains.

**Other Potential Water Resource Impacts**

None

# ALTERNATIVE 3
## Water Resources
### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Blue Sky site #1*

Same as Alternative 2. No discharge potential.

*Blue Sky site #2*

Different from Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** with the addition of the Forest Service WRPM (Appendix 1A) because the straw bales/coils would ensure an effective sediment barrier that would prevent sediment generated by the mining activity from reaching Swamp Creek.

Ground cover in the 16 feet that separates Swamp Creek from the test site is 100% grasses and forbs and the topography is flat.

*Blue Sky site #3*

Same as Alternative 2. Under Alternative 3, potential for a discharge into Bull Run Creek remains despite the additional Forest Service WRPMs because there are no WRPMs that could be identified that would address active mining in the side channel. However, the amount may be less than under Alternative 2.

Ground cover on the valley floor is 100% and composed of lush grasses and forbs.

*Blue Sky site #4*

Different from Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** with the addition of the Forest Service WRPM (Appendix 1A) which clarifies the starting point of the buffer width measurement. The WRPM, which clarifies the Plan-specific buffer, places the mining activities clearly on a flat valley floor with a full 30 foot zone of flat, well-vegetated ground buffer, in addition to the active floodplain width, and have the added barrier of the straw bales/coils between the activity and the stream. Therefore, there would be sufficient sediment trapping mechanisms in place (ground cover and straw bales/coils) to prevent sediment from reaching the creek.

Ground cover on the valley floor is 100% with grasses and forbs. Ground is flat and valley bottom varies between 24 and 80 feet wide. Ground cover on hillslope is also 100% with grasses, needles, and forbs. Well forested with lodgepole and larch.

*Bull Run site #1*

Different from Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** with the addition of the Forest Service WRPM (Appendix 1A) which clarifies the starting point of the buffer width measurement. The WRPM, which clarifies the Plan-specific buffer, places the mining activities clearly on a flat valley floor with a full 30-foot zone of flat, well-vegetated ground buffer, in addition to the active floodplain width, and have the added barrier of the straw bales/coils between the activity and the stream. Therefore, there would be sufficient sediment trapping mechanisms in place (ground cover and straw bales/coils) to prevent sediment from reaching the creek.

Ground cover on the valley floor is 100% and composed of forbs, grasses and needles. Lodgepole is present. On the active floodplain, the ground cover is 100% and is dense with grasses, forbs, sedges, and riparian woody (willow, alder, other).

*Bull Run site #2*

Different from Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** because of the addition of the Forest Service WRPMs (Appendix 1) which would not approve the bridge for use, thereby leaving the stream banks well vegetated and undisturbed. Instead, a two track road to the site would be sited through the forest with input from the Forest Service

and would ensure that any areas of concern are avoided and the appropriate Forest Service WRPM put into place.

Ground cover on the terrace is estimated at 75% or more and is grasses and forbs. Terrace is flat to gently sloping.

Ponds

*Source water pond*

Same as Alternative 2. No potential for a discharge.

*Settling ponds*

Same as Alternative 2. No potential for a discharge.

Fords

Same as Alternative 2. No potential for a discharge.

Bridges

*Existing bridge*

Same as Alternative 2. No potential for a discharge as a result of use.

*Proposed temporary bridge*

Dropped under Alternative 3. Temporary bridge would be replaced with the proposed two-track road 7300-M4b.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

*Existing TA roads*

Same as Alternative 2. No potential for a discharge.

*Proposed temporary road 7300-M4a and M4b*

Different from Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** as a result of the addition of Forest Service WRPMs (Appendix 1A) and General Requirements (Appendix 2). See Appendix 3 for detailed discussion.

*Proposed TA road 7300-M1b*

Different than Alternative 2. Under Alternative 3, this road would be added to replace the temporary bridge option. This road would be a two-track native surface road and would connect to 7300-M4b. No potential for a discharge because of the additions of Forest Service WRPMs (Appendix 1A) and General Requirements (Appendix 2). See Appendix 3 for detailed discussion.

**Clean Water Act, Section 303(d)** (antidegradation)

Same as Alternative 2. Bull Run Creek is listed for sedimentation and the activities proposed in this Plan would maintain the water quality condition for which this stream is listed.

**Suction Dredging**

Same as Alternative 2. The analysis found that suction dredging would have no impact on stream temperature or channel bed stability for the same reasons stated under Alternative 2. Suction dredging would have localized and permanent impacts related to pool frequency and distribution, habitat complexity and substrate and localized but short-term impacts to turbidity for the same reasons stated under Alternative 2.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) existing source water pond, 2) existing settling ponds, 3) existing temporary access roads, 4) the proposed temporary access roads, 5) an existing bridge, and 6) a proposed temporary bridge.

Ponds

*Source water pond*

Same as Alternative 2. Use of the ponds would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Settling ponds*

Same as Alternative 2. Use of the ponds would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Access Roads

*Existing TA roads*

Same as Alternative 2. Use of the roads would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Proposed temporary road 7300-M4a and M4b*

Different than Alternative 2. Under Alternative 3, construction and use of these roads would be in compliance with MM-2 as a result of the addition of Forest Service WRPMs (Appendix 1A) and General Requirements (Appendix 2). See Appendix 3 for detailed discussion.

*Proposed TA road 7300-M1b*

Different than Alternative 2. Under Alternative 3, this road would be added under Alternative 3 to replace the temporary bridge option. Construction and use of this road would be in compliance with MM-2 as a result of the addition of Forest Service WRPMs (Appendix 1A) and General Requirements (Appendix 2). See Appendix 3 for detailed discussion.

Bridges

*Existing bridge*

Same as Alternative 2. Use of the existing wooden bridge would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Proposed temporary bridge*

DROPPED under Alternative 3. Replaced with proposed TA road 7300-M1b.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. Only *Pool Frequency* and *Substrate Sediment* have the potential to be affected as a result of suction dredging. The changes would be permanent but localized to the area dredged and there would be no measurable changes to these inchannel characteristics even within the Plan analysis area.

**Wetlands and Floodplains**

Different than Alternative 2. Under Alternative 3, the mining activity is proposed in the active to 5-year floodplain at Blue Sky site #3 would be in compliance with Executive Order 11988 (Protection of Floodplains) as a result of the addition of Forest Service WRPM. This WRPM requires that the hole at this site be filled at the end of the season and the disturbed area be

seeded and covered with straw. The WRPM ensures that should the area flood in the spring, erosion would be minimal and channel formation on the valley floor would not occur.

Same as Alternative 2. Executive Order 11990 (Protection of Wetlands) does not apply because the miner does not propose any activity in wetlands.

**Other Potential Water Resource Potential Impacts**

None

# Blue Smoke

**Plan type**: Placer
**Subwatershed:** Lower Granite (HUC 170702020203)
**Subwatershed acres:** 20,282 acres
**Analysis area:** 1.75 acres
**Creek**: Granite Creek (perennial flow and fish-bearing)
**Stream Order:** 5th
**303(d) listed:** Yes for sedimentation
**Suction Dredging:** Yes
**Essential Salmon Habitat:** Yes

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Sites 1, 2 and 3*

No potential for a discharge of any pollutants from mining activity at site 1 into Granite Creek because the mining area is separated from Granite Creek by 1) the powerline road, 2) a series of old dredge ponds which have developed lush riparian vegetation adjacent to them, and 3) County Road 24.

Ponds

*Source water pond*

No potential for a discharge via surface or subsurface flow because only withdrawing water from an existing pond.

*Settling ponds*

No potential for a discharge via surface flow from the settling pond into Granite Creek under because the proposed settling pond is an old dredge pond and capable of receiving volumes of water much greater then proposed by the operation and is separated from Granite Creek by County Road 24.

No potential for a discharge via subsurface flow from the settling pond because the County Road 24 road fill has limited permeability. Only a shift in vegetation type on the fill slope

adjacent to Granite Creek suggests that some water is seeping through the fill, but no signs of erosion were observed on the fill slope in this area.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Existing temporary access road (1000-E1a) is proposed for use.

No potential for a discharge into Granite Creek from use of this road because the road is stable and separated from Granite Creek by a fill slope, small floodplains around the old dredge ponds and County Road 24.

**Clean Water Act, Section 303(d)** (antidegradation)

Granite Creek is 303(d) listed for sedimentation by ODEQ. Sedimentation is defined by ODEQ as: "The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry…."

The mining activities on land and suction dredging proposed in this Plan would not alter the existing the water quality condition for which this stream is listed for the following reasons. There would be no potential for increased sedimentation from the proposed activities on land because there would be no inputs of fine sediment due to mining-related activities. With respect to suction dredging, no new sediment would be added into the stream but simply loosened and redistributed downstream during the spring high flows. The changes in substrate would be permanent but highly localized and restricted to the areas that are suction dredged.

**Suction Dredging**

Suction dredging is permitted under the ODEQ 700PM permit (Appendix 4A). This permit has a series of requirements for dredging in any stream with additional requirements for dredging in essential salmon habitat. Granite Creek is essential salmon habitat and therefore all aspects of the 700PM permit apply. While Granite Creek is 303d listed for sediment, suction dredging is grandfathered in on Granite Creek under Schedule C.19.
In evaluating suction dredging on Granite Creek in the area of the proposed operation impacts to the following parameters were considered: pool frequency and distribution, habitat complexity (e.g. log jams, instream wood, beaver dams), stream temperatures, turbidity, and substrate, and channel bed stability (Appendix 4B, 4C). The analysis assumes that the miner would be in compliance with the 700PM permit (Appendix 4A) and all its requirements.

Site Characteristics

The channel bed in this area is predominantly cobbles with some gravels and sands and highly stable given the abundance of cobbles. Granite Creek was historically placer mined and therefore, the percentage of the silts and clays in the channel bed is expected to be limited. The only source of abundant fine-grained material would be the stream banks. However, no mining or destabilizing of the stream banks is permitted under the 700PM permit (Schedule C.5, 6, 7 and 8).

Water Quality and Channel Morphology analysis

*Pool frequency and distribution:* Localized changes in pool frequency and locations related to suction dredging would occur as dredging will create pools and loosen the substrate. The pool created by suction dredging is likely to be permanent because the amount of bedload moving through the stream is limited and the sediment disturbed by suction dredging would be redistributed downstream during high flow events.

*Habitat complexity*: Potential local changes in habitat complexity would occur because boulders and habitat structures may be moved around in the stream but not removed. Therefore, the impacts of suction dredging on in-channel habitat complexity may occur but should be limited to small areas. The changes would be permanent

Schedule C.6 prohibits removing or disturbing boulders, rooted vegetation, or embedded woody plants and other habitat structures from the stream banks. Habitat connected to the stream banks (beaver dams, undercuts, root wads etc.) therefore would remain intact thereby ensuring that some key habitat types would not be modified.

*Stream temperatures*: No changes to stream temperatures because suction dredging would not alter stream channel widths, channel depths, remove stream side shade or alter groundwater flows.

*Turbidity*: Local change in water clarity would occur as represented by changes in turbidity. Turbidity could extend beyond the immediate area that is dredged but changes in water clarity are not allowed under the 700 PM permit to extend beyond 300 feet downstream. However, given the past history of placer mining in this stream, fines are expected to be limited in the channel bed and therefore the turbidity plume is expected to dissipate much sooner than 300 feet downstream. In addition, the turbidity plume would only occur when dredging is occurring. Therefore, the temporal impact is limited to the when the miner is suction dredging.

*Substrate:* Local changes in channel bed substrate are expected as a result of suction dredging. Dredging would pull sediment from the channel bed, pass it up through a suction hose, and run it across a recovery system (sluice box) floating at the surface. The gravel and other material, which washes through the recovery system, would then be washed back into the

stream. Pools would be created where the sediment was pulled from and small dredge tailings piles created where the gravel and other material was deposited. In some cases the gravel and other material would be put back into the pool and in other cases deposited in the channel but not in the pool. These dredge tailings would be mobilized during the spring high flow and redistributed downstream. The changes in substrate at the dredge pool location would be permanent but highly localized.

*Channel bed stability*: No changes to channel bed stability would occur even through dredging will create pools because the channel bed is composed of cobbles, sand and gravel. Therefore, no headcutting and bed destabilization is expected to occur.

Summary of Effects

The analysis found that suction dredging would have no impact on 1) stream temperature or 2) channel bed stability for the reasons stated above. Suction dredging would have a local impact on 1) pool frequency and distribution, 2) habitat complexity, 3) turbidity and 4) substrate for the reasons stated above. The changes to pool frequency, habitat complexity and substrate are expected to be permanent but limited to the area worked and therefore would not have a measurable impact on channel complexity or channel stability. Changes in turbidity would impact less than 300 feet of stream and not be permanent but limited to the period of time that the miner is suction dredging.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) an existing source water pond, 2) an existing settling pond and 3) an existing temporary access road (TA road 1000-E1a).

Ponds

*Source water pond*

Use of the existing source water pond would be in compliance with MM-2 because only water is being withdrawn. Therefore, there would be no impacts water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*Settling ponds*

Use of the existing settling pond would be in compliance with MM-2 because there would no impacts water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Access Roads

Use of existing temporary access road 1000-E1a would be in compliance with MM-2 because there would be no impacts to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* Localized changes in *Pool Frequency* and locations would occur as dredging will create pools and loosen the substrate. The pool created by suction dredging is likely to be permanent because the amount of bedload moving through the stream is limited and the sediment disturbed by suction dredging would be redistributed downstream during high flow events.

No changes would occur to pool frequency related to potential for inputs of fine sediment from mining activity because inputs would move through the system as suspended load and not settle out in the pools. There would be no changes in pool frequency related to *Large Woody Debris* recruitment because no trees are proposed for removal.

*Water Temperature:* No changes in *Water Temperature* would occur because 1) there would be only very limited removal of trees and none would be shade trees and 2) suction dredging would occur under the requirements established in the ODEQ 700 PM permit which would ensure that there would be no increases in stream channel widths which would alter water depths and influence stream temperatures (Appendix 4A). In addition, the channel bed is composed of cobbles, gravels and sand and is highly stable. Therefore, suction dredging would not trigger a headcut and alter channel depths.

*Large Woody Debris:* No changes in *Large Woody Debris* recruitment or existing wood in the stream would occur because 1) the only place where trees would be cut is in the spur road/skid trail so that potential LWD recruitment would not be affected, and 2) suction dredging would occur under the requirements established in the ODEQ 700 PM permit. Schedule C.6, 7, and 8 of the permit limits the amount of instream habitat structures that can be moved or altered (Appendix 4A).

*Substrate:* Local changes in channel bed substrate are expected as a result of suction dredging. Dredging would pull sediment from the channel bed, pass it up through a suction hose, and run it across a recovery system (sluice box) floating at the surface. The gravel and other material, which washes through the recovery system, would then be washed back into the stream. Pools would be created where the sediment was pulled from and small dredge tailings piles created where the gravel and other material was deposited. In some cases the gravel and other material would be put back into the pool and in other cases deposited in the channel but not in the pool. These dredge tailings would be mobilized during the spring high flow and redistributed downstream. The changes in substrate at the dredge pool location would be permanent but highly localized.

No changes would occur to substrate sediment as a result of potential for inputs of fine sediment related to mining activity because inputs would move through the system as suspended load.

*Bank Stability:* No changes in *Bank Stability* because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* because 1) there would be no change to *Bank Stability* and 2) suction dredging would occur under the requirements established in the ODEQ 700 PM permit (Appendix 4A). Currently channel bed composition is a mix of cobbles, sands and gravels and highly stable. Therefore, there would be no potential for suction dredging to trigger a headcut.

**Wetlands and Floodplains**

No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

## ALTERNATIVE 3
## Water Resources
## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Sites 1, 2 and 3*

Same as Alternative 2. No discharge potential.

Ponds

*Source water pond*

Same as Alternative 2. No discharge potential.

*Settling ponds*

Same as Alternative 2. No discharge potential.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No discharge potential.

**Clean Water Act, Section 303(d)** (antidegradation)

Same as Alternative 2. Granite Creek is listed for sedimentation and the activities proposed in this Plan would maintain the water quality condition for which this stream is listed.

**Suction Dredging**

Same as Alternative 2. The analysis found that suction dredging would have no impact on stream temperature or channel bed stability for the same reasons stated under Alternative 2. Suction dredging would have localized and permanent impacts related to pool frequency and distribution, habitat complexity and substrate and localized but short-term impacts to turbidity for the same reasons stated under Alternative 2.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) an existing source water pond, 2) an existing settling pond and 3) an existing temporary access road (TA road 1000-E1a).

Ponds

*Source water pond*

Same as Alternative 2. Use of the source water pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Settling pond*

Same as Alternative 2. Use of the settling pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Access Roads

Same as Alternative 2. Use of the existing TA road would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. Only *Pool Frequency* and *Substrate Sediment* have the potential to be affected as a result of suction dredging. The changes would be permanent but localized to the area dredged and there would be no measurable changes to these inchannel characteristics even within the Plan analysis area.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# Bunch Bucket

**Plan type**: Placer
**Subwatershed**: Clear Creek (HUC 170702020204)
**Subwatershed size:** 13,075 acres
**Analysis area:** 10 acres
**Creek**: Clear Creek (perennial flow and fish-bearing)
**Stream Order:** 3rd or 4th depending on the mining site
**303(d) listed:** No
**Suction Dredging:** No
**Essential Salmon Habitat**: Yes

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Site 1*

No potential for a discharge of sediment into Clear Creek because the site on flat ground and is separated from the creek by at least 82 feet of flat ground, with abundant ground cover composed of lush grasses and forbs, and a road that is 70 feet from the creek. Therefore, movement of sediment off the site would not be expected, but if it were to occur, the sediment would be trapped by the road before reaching the creek.

*Site 2*

No potential for a discharge of sediment into Clear Creek because the site is on a hillslope that is separated from the creek by 150 feet of flat ground and a road.

*Small creek*

This creek was identified by the miner as occurring in Site 1.

Potential for a discharge because the miner's WRPMs for the very small creek would likely create sediment. However, the small creek was not observed by either the hydrologist or the minerals administrator, so the creek and its connectivity to Clear Creek could not be determined. Therefore, the worst case scenario was used (small creek and Clear Creek are connected), and in this scenario there would be a potential for a discharge of sediment into Clear Creek.

Ponds

The source water pond and the settling pond are the same depression. The pond was dry during the site visit and the lack of any vegetation in the bottom of the pond indicates that the amount of water is limited.

*Source water pond*

No potential for a discharge via surface or subsurface flow because the miner would only be withdrawing water.

*Settling ponds*

No potential for a discharge via surface or subsurface flow from the settling pond into Clear Creek because the pond is 1) more than 100 feet from the creek, 2) is separated from the creek by a road that is bermed on the side closest to the stream with the road more than 70 feet from the creek, 3) the ground is flat, and 4) the ground vegetation is 100 percent and very lush.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Miner proposes to use three existing Temporary Access roads (Appendix 6). All of these access roads are more than 100 feet from Clear Creek and separated from the creek by flat, well-vegetated ground. Therefore, any sediment that would erode off the road would be trapped by the vegetation and not reach the creek. Therefore, no potential for a discharge into Clear Creek as a result of road use. See Appendix 3 for detailed discussion.

**Clean Water Act, Section 303(d)** (antidegradation)

Clear Creek is not 303(d) listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are the existing temporary access roads.

Ponds

N/A. The pond proposed for use is outside the RHCA. The question of compliance with MM-2 does not apply.

Access Roads

Use of the TA roads would be in compliance with MM-2 because there would be no impacts to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* No changes in *Pool Frequency* would occur as a result of the proposed activities for the following reasons: 1) The potential inputs of fine sediment under Alternative 2 would be small and move through the system as suspended load, 2) no changes to large woody recruitment are expected (see below), and 3) no suction dredging is proposed.

*Water Temperature:* No changes in *Water Temperature* would occur because 1) there would be no activity in the channel or on the stream banks which would alter channel width and therefore change flow depths for a given discharge, and 2) there would be only very limited removal of trees, none of which would be shade trees.

*Large Woody Debris:* No changes in *Large Woody Debris* recruitment or existing wood in the stream would occur because 1) the only place where trees would be cut is in the spur road/skid trail so that potential LWD recruitment would not be affected, and 2) there would be no activity in the channel to alter existing amounts.

*Substrate Sediment:* No changes in *Substrate Sediment* because 1) no suction dredging is proposed, 2) no other inchannel activity is proposed, and 3) the potential inputs of fine sediment would be small and would move through the system as suspended load.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* would occur for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability* and 2) no instream activity which could trigger a headcut.

**Wetlands and Floodplains**

No activity is proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# ALTERNATIVE 3
# Water Resources
## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Site 1*

Same as Alternative 2. No potential for a discharge

*Site 2*

Same as Alternative 2. No potential for a discharge

*Small creek*

Different than Alternative 2. Under Alternative 3, the discharge potential into the small creek **would be eliminated** because the Forest Service WRPMs (Appendix 1A) would allow for appropriate protections measures to be identified prior to any activity.

Ponds

The source water pond and the settling pond are the same depression. The pond was dry during the site visit and the lack of any vegetation in the bottom of the pond indicates that the amount of water is limited.

*Source water pond*

Same as Alternative 2. No potential for a discharge.

*Settling ponds*

Same as Alternative 2. No potential for a discharge.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No potential for a discharge.

**Clean Water Act, Section 303(d)** (antidegradation)

Clear Creek is not 303(d) listed.

**Suction Dredging**

None proposed

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are the existing temporary access roads.

Ponds

N/A. Same as Alternative 2. The pond proposed for use is outside the RHCA. The question of compliance with MM-2 does not apply.

Access Roads

Same as Alternative 2. Use of the TA roads would be in compliance with MM-2. The pond is outside the RHCA.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. The RMO parameters would not be affected.

### Wetlands and Floodplains

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

### Other Potential Water Resource Impacts

None

# City Limits

**Plan type**: Placer
**Subwatershed:** Upper Granite Creek (HUC 170702020201)
**Subwatershed size:** 9,312 acres)
**Analysis area:** 1 acre
**Creek**: Granite Creek (perennial flow and fish-bearing)
**Stream Order:** 4th
**303(d) listed:** Yes for sedimentation
**Suction Dredging:** No
**Essential Salmon Habitat:** Yes

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

Ground cover on the hillslope where the test holes will be dug is 100%. Cover is grasses, forbs and needles.

No potential for a discharge via surface or subsurface flow of sediment into Granite Creek because the mining activity area and the processing area is separated from Granite Creek by Forest Road 73 and old tailings.

Ponds

*Source water pond*

No potential for a discharge via surface or subsurface flow because the miner would only withdraw water from an existing pond.

*Settling ponds*

No potential for a discharge via surface flow from the settling ponds into Granite Creek because the ponds are old dredge ponds and capable of receiving volumes of water much greater than proposed by the operation, and are separated from Granite Creek by Forest Road 73 and other old placer tailings.

No potential for a discharge via subsurface flow from the settling pond because Forest Road 73 road fill has limited permeability and the ponds have silt on their bottoms, indicating that the ponds have sealed and are not moving sediment through the subsurface.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Miner proposes to use two existing Temporary Access roads (Appendix 6). No potential for a discharge into Granite Creek as a result of road use. All of these access roads are more than 100 feet from Granite Creek and separated from the creek by Forest Road 73 and old dredge ponds. There is sufficient ground to trap any sediment that is generated by road use and prevent it from reaching the creek. See Appendix 3 for detailed discussion.

**Clean Water Act, Section 303(d)** (antidegradation)

Granite Creek is 303(d) listed for sedimentation by ODEQ. Sedimentation is defined by ODEQ as: "The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry…."

The activities proposed in this Plan would not alter the existing water quality condition because 1) there would be no sediment input into the creek and 2) no suction dredging is proposed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) an existing source water pond, 2) existing settling ponds and 3) two existing temporary access roads.

Ponds

*Source water pond*

Use of the existing source water pond would be in compliance with MM-2 under Alternative 2 because the miner would only withdraw water from the pond. Therefore, no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation.

*Settling ponds*

Use of the existing settling ponds would be in compliance with MM-2 under Alternative 2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Access roads

Use of the existing TA roads would be in compliance with MM-2 under Alternative 2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* No changes in *Pool Frequency* would occur as a result of the proposed activities for the following reasons: 1) no potential for a discharge of sediment as a result of any proposed activity, 2) no changes to large woody recruitment are expected (see below), and 3) no suction dredging is proposed.

*Water Temperature:* No changes in *Water Temperature* would occur because 1) there would be no activity in the channel or on the stream banks which would alter channel width and therefore change flow depths for a given discharge, and 2) there would be only limited removal of trees, none of which would be shade trees.

*Large Woody Debris:* No changes in *Large Woody Debris* recruitment or existing wood in the stream would occur because 1) only small saplings would be cut is in access road and on the hillslope were mining is proposed and these areas are more than 100 feet from the creek and separated from the creek by Forest Road 73 and 2) no instream activity is proposed that would alter existing amounts and distributions.

*Substrate Sediment:* No changes in *Substrate Sediment* because 1) no suction dredging is proposed, 2) no other inchannel activity is proposed, and 3) no potential for a discharge of sediment from mining activities on land.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* would occur for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability* and therefore channel widths and 2) no instream activity is proposed which could trigger a headcut and alter channel depths.

**Wetlands and Floodplains**

No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# ALTERNATIVE 3
# Water Resources
## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

Same as Alternative 2. No potential for a discharge.

Ponds

*Source water pond*

Same as Alternative 2. No potential for a discharge.

*Settling ponds*

Same as Alternative 2. No potential for a discharge.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No potential for a discharge.

**Clean Water Act, Section 303(d)** (antidegradation)

Same as Alternative 2. Granite Creek is 303(d) listed for sedimentation and the activities proposed in this Plan would maintain the existing water quality condition for which this stream is listed.

**Suction Dredging**
None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) an existing source water pond, 2) existing settling ponds, and 3) two existing temporary access roads.

Ponds

*Source water pond*

Same as Alternative 2. Use would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Settling ponds*

Same as Alternative 2. Use would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Access roads

Same as Alternative 2. Use of the existing TA roads would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. No changes in the RMO parameters.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# East Ten Cent

**Plan type**: Placer
**Subwatershed:** Lower Granite (HUC 170702020206)
**Subwatershed size:** 20,282 acres
**Analysis area:** 2 acres
**Creek**: East Ten Cent Creek (intermittent flow and non-fish bearing)
**Stream Order:** 2nd
**303(d) listed:** No
**Suction Dredging:** No
**Essential Salmon Habitat:** No

## ALTERNATIVE 2
## Water Resources
### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

Potential for a discharge via surface flow of sediment into East Ten Cent Creek as a result of the mining activity. The miner proposes to mine from north to south. However, the north portion is in close proximity to the creek, elevationally above it and the old tailings which make up the fill slope of the bench feeds directly into the creek. The bench that separates the north mining area from the creek is narrow in this area and there is little room for equipment to turn around or for any overburden to be placed on the berm without it eroding and entering the creek.

Ponds

The source water pond and the settling pond are the same pond.

*Source water pond*

No potential for a discharge via surface or subsurface flow when used as a source water pond because the miner would only withdraw water.

*Settling Ponds*

No potential for a discharge via surface flow when used as a settling pond into East Ten Cent Creek because the pond is an old dredge pond and a berm exists between the creek and the ponds.

No potential for a discharge via subsurface flow when used as a settling pond because the pond is well-sealed with fines, contains vegetation, and no changes are expected in the volume of water entering the pond during the operation.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Bridges

One existing wooden foot bridge across East Ten Cent Creek is proposed for use. Bridge would only be used for foot traffic. No potential for a discharge of sediment as a result of use because bridge is existing and stable and no bridge modifications planned.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Miner proposes to use two closed Forest Service roads and two existing Temporary Access roads (Appendix 6). The Forest Service roads and one of the mine access roads have an aggregate surface. The other mine access road is a native surface road.
No potential for a discharge from use of any of the roads because they are all separated from the creek by either dense vegetation and/or old mine tailings. Both are effective at trapping any sediment that is generated by road use and prevent it from reaching the creek.

**Clean Water Act, Section 303(d)** (antidegradation)

East Ten Cent Creek is not 303(d) listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) an existing source water pond, 2) existing settling pond, 2) one closed Forest Service road (7350-050), 3) two existing temporary access roads, and 4) one existing bridge. Forest Service closed road 7350-070 is also proposed for use but is outside the RHCA and therefore not discussed further.

Ponds

The source water pond and the settling pond are the same pond.

*Source water pond*

Use of the pond as a source water pond would be in compliance with MM-2 because the miner would only be withdrawing water. Therefore, no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation.

*Settling ponds*

Use of the pond as a settling pond would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Access Roads

*FS closed road (7350-050)*

Use of the FS closed road would be in compliance with MM-2 because no impacts water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*Existing TA roads*

Use of the existing TA roads would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Bridges

Use of the existing wooden bridge across East Ten Cent Creek would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* No changes in *Pool Frequency* would occur as a result of the proposed activities for the following reasons: 1) The potential inputs of fine sediment would be small and move through the system as suspended load, 2) no changes to large woody recruitment are expected (see below), and 3) no suction dredging is proposed.

*Water Temperature:* No changes in *Water Temperature* would occur because 1) there would be no activity in the channel or on the stream banks which would alter channel width and therefore change flow depths for a given discharge, and 2) there would be only very limited removal of trees, none of which would be shade trees.

*Large Woody Debris:* No changes would occur to *Large Woody Debris* recruitment or existing wood in the stream because 1) the only place where trees would be cut is in the small area to be mined and 2) there would be no activity in the channel to alter existing amounts and distributions.

*Substrate Sediment:* No changes in *Substrate Sediment* because 1) no suction dredging is proposed, 2) no other inchannel activity is proposed, and 3) the potential inputs of fine sediment would be small and would move through the system as suspended load.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* would occur for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability* and therefore channel widths and 2) no instream activity which could trigger a headcut and alter channel depths.

**Wetlands and Floodplains**

No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# ALTERNATIVE 3
# Water Resources
## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

<u>Mining Activity</u>

Different than Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** because the change in the direction of work (FROM north to south TO south to north) allows the bench width at the northern part of the area to be mined to be increased PRIOR to activity. This, in combination with the placement of straw bales at the edge of the bench to separate the

mining area from the fill slope of old tailings that feeds directly into the creek, would prevent sediment from entering the creek. In addition, the area where the overburden will be stockpiled is separated from the creek by the E1A-070 road, and the intervening area has ground cover of grasses and forbs.

Ponds

*Source water pond*

Same as Alternative 2. No potential for a discharge.

*Settling ponds*

Same as Alternative 2. No potential for a discharge.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Bridge

Same as Alternative 2. No potential for a discharge from use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No potential for a discharge.

**Clean Water Act, Section 303(d)** (antidegradation)

East Ten Cent Creek is not 303(d) listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) an existing source water pond, 2) existing settling pond, 2) one closed Forest Service road (7350-050), 3) two existing temporary access roads, and 4) one existing bridge.

Ponds

The source water pond and the settling pond are the same pond.

*Source water pond*

Same as Alternative 2. Use would be in compliance with MM-2.

*Settling ponds*

Same as Alternative 2. Use would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Access Roads

*FS closed road (7350-050)*

Same as Alternative 2. Use of this FS closed road would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Existing TA roads*

Same as Alternative 2. Use of the existing TA roads would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Bridges

Same as Alternative 2. Use of the existing wooden bridge would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. No changes in the RMO parameters.

**Wetlands and Floodplains**

Same as Alternative 2. No activity is proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# Eddy Shipman

**Plan type**: Placer and Lode
**Subwatershed:** Upper Granite (HUC 170702020201)
**Subwatershed size:** 9,312 acres
**Analysis area:** 2.5 acres
**Creek**: Granite Creek (perennial flow and fish bearing) and Chipman Gulch (intermittent flow and non-fish-bearing)
**Stream Order:** Granite = 2nd, Chipman Gulch = 1st
**303(d) listed:** Yes for Granite Creek for sedimentation
**Suction Dredging:** No
**Essential Salmon Habitat:** Granite Creek = Yes. Chipman Gulch = No.

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Lode mining (east and west side adits)*

Potential for a discharge of heavy metals via surface and subsurface flow into Granite Creek because the waste rock is expected to be high in heavy metals based on evaluations of the area. Adit A, on the east side of Forest Road 73, is above Granite Cr. and about 150 feet from the creek. Therefore, if groundwater is encountered and it seeps into the ground then subsurface flow will be towards the creek. Adit B, on the west side of Forest Road 73, may also intercept groundwater. Water exiting the adit would enter the ground. Given the close proximity of the gulch and the creek to the adits, contaminated groundwater could reach these creeks.

*Placer mining*

No potential for a discharge as a result of placer mining because the area to be mined is behind tailings which would effectively trap any sediment that moved off site.

Ponds

The source water pond and the settling ponds are the same for both Lode and Placer processing. They are existing dry ponds created by placement of old placer tailings.

*Source water pond*

Potential for a discharge of water via surface flow into Granite Creek because the existing depression to be used as a source water pond is not sufficiently bermed at its lower end where it is adjacent to the wet meadow. The distance between the pond and the creek is about 60 feet.

*Settling ponds*

Under Alternative 2, use of the settling pond would NOT be in compliance with MM-2 because of the potential to discharge sediment and heavy metals into Granite Creek via surface flow (sediment) and subsurface flow (heavy metals). See Appendix 3 for detailed discussion.

Fords

One existing ford proposed for use via closed Forest Service road 7300-680 and temporary access road 7300-E1d. Potential for discharge of sediment from use of the ford to access Adit A on the west side because the approaches are sloped and composed of fine-grained sediments and serve as a sediment source that could easily reach the creek. The ford is about 50 feet wide.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Miner proposes to use two closed Forest Service roads and three existing Temporary Access roads (Appendix 6).

*East side access*

***FS closed road 7300-680 and TA road 7300-E1d***

Potential for a discharge related to use of FSR 7300-680 and existing temporary mine-access road 7300-E1d because both roads slope towards Granite Creek and are composed of a mix of fines and coarser material.

*West side access*

***FS closed road 7300-590 and TA roads 7300-E1a and E1b***

No potential for a discharge related to use of the other existing roads because they cross the creek via a culvert, are located on flat ground and/or are distant from the creek.

**Clean Water Act, Section 303(d)** (antidegradation)

Granite Creek is 303(d) listed for sedimentation by ODEQ. Sedimentation is defined by ODEQ as: "The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry…."

The activities proposed in this Plan would not change the water quality condition for which this stream is listed, despite the potential inputs of fine sediment and or heavy metals because the sediment would move through as suspended load and the heavy metals would move through in solution.

**Suction Dredging**

None proposed

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) proposed source water pond, 2) proposed settling ponds, 3) two closed FS roads, and 4) four existing temporary access roads. The proposed ponds would be used for both lode processing and placer processing.

Ponds

Use of the source water pond would be in compliance with MM-2 because the miner would only withdraw water. Therefore, no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Use of the settling pond would NOT be in compliance with MM-2 because there is the potential to discharge heavy metals and sediment into Granite Creek. See Appendix 3 for detailed discussion.

Access Roads (West side)

*FS closed road 7300-590 and TA roads 7300-E1a and E1b*

Use of these roads would be in compliance with MM-2 because there would be no impacts to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Access Roads (East side)

*FS closed road 7300-680 and TA road 7300-E1d*

Use of these roads would NOT be in compliance with MM-2 because of potential impacts to water quality. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* No changes in *Pool Frequency* would occur because 1) the potential inputs of fine sediment under Alternative 2 would move through the system as suspended load and 2) there would be no changes in pool frequency related to *Large Woody Debris* recruitment because any trees cut would be individually selected and at least 50 feet from the creek.

*Water Temperature:* No changes in *Water Temperature* would occur because 1) there would be no activity in the channel or on the stream banks which would alter channel width and therefore change flow depths for a given discharge, and 2) there would be only very limited removal of trees, none of which would be shade trees.

*Large Woody Debris:* No changes would occur in *Large Woody Debris* recruitment or existing wood in the stream because 1) only selected trees for mining timbers would be removed and these would be at least 50 feet from the creek and 2) there would be no activity in the channel to alter existing amounts.

*Substrate Sediment:* No changes in *Substrate Sediment* because 1) no suction dredging is proposed, 2) no other inchannel activity is proposed, and 3) the potential inputs of fine sediment would be small and would move through the system as suspended load and not alter the substrate.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes would occur in *Lower Bank Angle* for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability* and 2) no instream activity is proposed that could trigger a headcut.

**Wetlands and Floodplains**

No activity is proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

## Other Potential Water Resource Impacts

Stream flow and stream temperature alteration related to water withdrawals

The miner proposes to use a tributary to Granite Creek as source water for processing water from Chipman Gulch. Based on the equipment used, the pump would withdraw approximately 100 or 150 gpm or 0.2 to 0.3 c fs. This is the amount that is assumed would be withdrawn from Chipman Gulch and what is analyzed below for effects.

*Background*

The potential effect of withdrawing water from Chipman Gulch on stream flow in Chipman Gulch and Granite Creek was limited to the examination of several stream gages from the larger area to determine the timing of summer low flows because 1) there is no temperature data for Chipman Gulch and 2) there is no flow data for Chipman Gulch. . Chipman Gulch appears to be perennial but non-fish bearing due to a fish barrier (Allison Johnson, Umatilla NF fisheries biologist, email comm. May 30, 2013). Stream temperature data for Granite Creek from monitoring sites located upstream and downstream of Chipman Gulch is provided for reference.

a. Stream Temperatures

There is no temperature data for Chipman Gulch. However, there is stream temperature data for Granite Creek. Granite.93C.4 is located downstream of Chipman Gulch and Granite.93C.5 is located upstream of Chipman Gulch. The ODEQ stream temperature standard for Granite Creek is 53.6*F. The 7-day running average of the maximum daily stream temperatures for the years with data exceed ODEQ standard at both sites most years (**Table 7-3).**

**Table 7-3**
**7-day running average of the maximum daily stream temperature on Granite Creek in the vicinity of Eddy Shipman**

| 2010 NHD HUC 12 name | 2010 NHD HUC 12 | Creek | Hobo number | Survey Yr | District Av. 7 day | Elevation (ft) |
|---|---|---|---|---|---|---|
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.4 | 1997 | 57.85 | 5006 |
| | | | | | | |
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.5 | 1998 | 57.09 | 5200 |
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.5 | 2005 | 54.39 | 5200 |

b. Water Depths

There are no water depths for Chipman Gulch. The water depths measured at the Granite.93C.5 hobo site during installation and removal suggest that flows, at least in this section of Granite Creek, were relatively constant most years because water depths at the hobo site showed little reduction in depth over the season, except in 2003 (**Table 7-4**).

**Table 7-4**
**Water depths at hobo site on Granite Creek upstream of Chipman Gulch at installation and removal in the vicinity of Eddy Shipman**

| Hobo number | Survey Yr | Elevation (ft) | water depth at installation (inches) | water depth at removal (inches) | Installation Date | Removal Date |
|---|---|---|---|---|---|---|
| Granite.93C.5 | 1998 | 5200 | Not listed | 1.0 | July 15 | Oct 1 |
| Granite.93C.5 | 1999 | 5200 | 1.5 | 1.5 | June 28 | Sept 21 |
| Granite.93C.5 | 2002 | 5200 | 1.3 | 1.1 | July 2 | Oct 8 |
| Granite.93C.5 | 2003 | 5200 | 1.3 | 0.5 | June 25 | Oct 21 |
| Granite.93C.5 | 2005 | 5200 | 1 | 0.9 | June 29 | Oct 13 |

c. Stream Flow

There is no stream flow data for Chipman Gulch. While there are no stream gages on Chipman Gulch or Granite Creek, stream hydrographs from six stream gages around the area were examined for the period of June 10 through Sept 30 for 2007 and 2013 to determine when stream flows were reflecting groundwater inputs only (base flows), and would therefore be at their lowest level(*project file)*. These years were selected because 2007 was a low flow year on some streams in the area, and 2013 includes some point-in-time stream flow measurements made on other streams in the analysis area. Drainage areas for these stream gages ranged from 7 sq. miles up to 121 sq. miles.

While there was some variability between years and stations, stream low flows tend to occur between early to mid-July through early to late September. Therefore, any water withdrawals during this time would occur when the flows would be at their lowest.

Predictions regarding climate change for the Blue Mountains are for increased periods of drought, reductions in snowpacks, and a shift in the timing of peak flows to earlier in the year (Luce et al 2013; Science Briefing 2014). Under these conditions, stream flows are expected to decrease during the summer months, the initiation of summer low flows may occur sooner (i.e. from early-mid July to sometime in June), and stream temperatures may increase. An additional impact is that some streams may change from perennial to intermittent flow.

*Conclusions*

Chipman Gulch has perennial flow and is non-fish bearing due to the presence of a fish barrier. The impact of withdrawing water from Chipman Gulch, under the right flow conditions, could cause the gulch to go dry. However, its contribution to Granite Creek is small compared to the flow on Granite Creek. Impacts to Granite Creek stream temperatures and flow as a result of water withdrawals are expected to be nonmeasurable. Therefore, the Plan would be in compliance with the John Day Basin TMDL.

# ALTERNATIVE 3
# Water Resources
## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Lode mining*

Different than Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** relative to the lode mining for two reasons: 1) General Requirement L5 requires that there be testing of the first run of material. If testing of the lode material from any of the adits and potentially subsequent material finds the ore has the potential to release acidity or other contaminates into the ground and into Granite Creek via surface or subsurface flow, then based on General Requirement L5, the miner would need to submit a supplement to their Plan that details how they would prevent heavy metals from entering Granite Creek. This supplement to their plan would then be evaluated and additional WRPMs would be put into place.

*Placer mining*

Same as Alternative 2. No discharge potential.

Ponds

*Source water pond*

Different Alternative 2. Under Alternative 3, the potential for a discharge via surface flow into Granite Creek during use **would be eliminated** as a result of the addition of Forest Service WRPMs (Appendix 1A). This WRPM requires that the pond be sufficiently bermed to prevent water from entering into the wet meadow via surface flow.

*Settling ponds*

Different than Alternative 2. Under Alternative 3, the potential for a discharge of sediment and/or heavy metals **would be eliminated** as a result of a Forest Service WRPM and General Requirements L3, 4, and 5. The WRPM would ensure that the settling pond was properly bermed to prevent sediment from entering the wetland via surface flow.

With respect to heavy metals, Forest Service General Requirements L3 and L4 require that the first run of material from any of the adits and potentially subsequent material be tested to assess the potential to release acidity or other contaminates into the ground and into Granite Creek via surface or subsurface flow. If the results were positive, then based on General Requirement L5, the miner would cease any lode related activity and would need to submit a supplement to their Plan that detailed how they would prevent heavy metals from entering Granite Creek. This supplement to their plan would then be evaluated and additional WRPMs would be put into place. Therefore, L5 **would eliminate** the potential for a discharge related to heavy metals.

Fords

Different than Alternative 2. Under Alternative 3, discharge potential from use of the existing ford via closed Forest Service road 7300-680 and temporary access road 7300-E1d **would be eliminated** because of the addition of Forest Service WRPM (Appendix 1A) which states that the ford approaches would be rocked. This WRPM would bury the fine sediments and eliminate the sediment source that could easily reach the creek.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

The miner proposes to use two closed Forest Service roads and four existing Temporary Access roads (Appendix 6).

*East side access*

***FS closed road 7300-680 and TA road 7300-E1d***

Different than Alternative 2. Discharge potential **would be eliminated** as a result of the addition of a Forest Service WRPM (Appendix 1A) that requires that portions of the roads be rocked to prevent rutting which would funnel water and sediment into Granite Creek.

*West side access*

***FS closed road 7300-590 and TA roads 7300-E1a and E1b***

Same as Alternative 2. No potential for a discharge.

**Clean Water Act, Section 303(d)** (antidegradation)

Same as Alternative 2. Granite Creek is 303(d) listed for sedimentation. However, the activities proposed in this Plan would not alter the existing water quality conditions for which this stream is listed for the same reasons as noted under Alternative 2.

**Suction Dredging**

None proposed

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) proposed source water pond, 2) proposed settling ponds, 3) two closed FS roads, and 4) four existing temporary access roads. The proposed ponds would be used for both lode processing and placer processing.

Ponds

Similar to Alternative 2. Under Alternative 3, use of the ponds would be in compliance with MM-2 as a result of the addition of a Forest Service WRPM and Lode related General Requirements. See Appendix 3 for detailed discussion.

Access Roads (West side**)**

*FS closed road 7300-590 and TA roads 7300-E1a and E1b*

Same as Alternative 2. Use of these roads would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Access Roads (East side)

*FS closed road 7300-680 and TA road 7300-E1d*

Different than Alternative 2. Under Alternative 3, use of these two roads would be in compliance with MM-2 because as a result of the addition of a Forest Service WRPM (Appendix 1A) which would rock the existing ford approaches and eliminate the potential for a discharge. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. No changes in the RMO parameters.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

Stream flow and stream temperature alteration related to water withdrawals

Same as Alternative 2. Impacts to Granite Creek stream temperatures and flow as a result of water withdrawals are expected to be nonmeasurable. Therefore, the Plan would be in compliance with the John Day Basin TMDL.

# Grubsteak

**Plan type**: Placer
**Subwatershed:** Clear Creek (HUC 170702020204)
**Subwatershed size:** 20,467 acres)
**Analysis area:** 2 acres
**Creek**: Clear Creek (perennial flow and fish-bearing)
**Stream Order:** 4th
**303(d) listed:** No
**Suction Dredging:** No
**Essential Salmon Habitat:** Yes

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Site A*

No potential for a discharge into Clear Creek because the site is located about 200 feet from the creek. The intervening ground is well vegetated and mostly flat.

*Site B*

Potential for a discharge because the description where the measurement of the miner-proposed 20-foot buffer starts is ambiguous and therefore, the effectiveness of the 20-foot buffer is uncertain. Depending on the starting point the miner intended to use, there "may" or "may not" be a potential discharge of a pollutant into Clear Creek.

a) If the buffer distance is measured from the edge of the Clear Creek stream bank, then it would put the mining activity on the valley floor less than 10 feet from the side channel which is connected at high flow to Clear Creek.

b) If the buffer distance is measured from the valley floor-channel break in slope of the side channel, then the mining area would be 20 feet from the edge of the side channel. The ground between the mining area and the side channel is vegetated and flat and would provide effective sediment trapping.

As a result of the uncertainty in miner-proposed buffer zone, the worst-case scenario was used (Appendix 1B, Figure 1, Point A) which may result in some activity on the flat valley floor close enough to the edge of the channel bank to trigger bank failure as a result of digging the test

holes and sediment entering the creek. Therefore, under Alternative 2, there would be the potential for a discharge of sediment into Clear Creek.

Ponds

*Existing pond (serves as both source water and settling pond)*

When being used as a source water pond, no potential for a discharge via surface or subsurface flow because the miner would only withdraw water.

When being used as a settling pond, no potential for a discharge via surface or subsurface flow because the pond is more than 200 feet from the creek and the sediments between the pond and the creek are a mix of coarse and fine sediments, resulting in low permeability.

*Proposed settling ponds*

The ponds could not be evaluated under Alternative 2 for compliance with MM-2 because the miner did not identify their location. They are only evaluated under Alternative 3.

Fords

One existing ford proposed for use on existing temporary mine access road 1300-M1a. Ford would be used to transport heavy equipment. Potential for a discharge of sediment into Clear Creek as a result of use of the ford because the approach on the southwest side is composed of fines can easily reach the creek. Ford would be used for movement of heavy equipment across the creek because the bridge wasn't designed for heavy equipment.

Bridges

One existing wooden bridge across Clear Creek is proposed for use. Bridge would be used for regular vehicle traffic only (i.e. ATV, pickup truck) because it was not designed for heavy equipment. Heavy equipment would be taken across the ford. No potential for a discharge of sediment as a result of use because bridge is existing and stable and no bridge modifications planned.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

The miner proposes to use one existing native surface Temporary Access road (Appendix 6).

No potential for a discharge because the access road is across flat ground, perpendicular to the stream where it crosses at the existing ford, and then goes through the forest. The only place where there is the potential for a discharge would be at the ford, and this potential impact was addressed above under the *Fords* section.

**Clean Water Act, Section 303(d)** (antidegradation)

Clear Creek is not 303(d) listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) one existing pond which serves as both source water and settling pond, 2) several proposed ponds, 3) one existing TA road, and 4) an existing bridge.

Ponds

*Existing pond when used as source water pond*

Use of the existing pond as a source water pond would be in compliance with MM-2 because the miner would only withdraw water. Therefore, no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation.

*Existing pond when used as settling pond*

Use of the existing pond as a settling pond would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*Proposed ponds*

Construction and use of the proposed ponds **could not be evaluated** for compliance with MM-2 because the miner did not provide a location. Ponds are only evaluated under Alternative 3.

Access Roads

Use of the existing TA road would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Bridges

Use of the existing wooden bridge to cross Clear Creek would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* No changes in *Pool Frequency* would occur as a result of the proposed activities for the following reasons: 1) The potential inputs of fine sediment under Alternative 2 would be small and move through the system as suspended load, 2) no changes to large woody recruitment are expected (see below), and 3) no suction dredging is proposed.

*Water Temperature:* Potential effect to *Water Temperature* as a result of flow reduction if groundwater reverses its flow direction and moves into *Site B hole*. This flow reversal could cause parts of Clear Creek to go dry which would lead to a reduction of flow downstream and lead to an increase in stream temperatures.

*Large Woody Debris:* No changes would occur in *Large Woody Debris* recruitment or existing wood in the stream because 1) no trees would be cut within 300 feet of the creek and 2) there would be no activity in the channel to alter existing amounts.

*Substrate Sediment:* No changes in *Substrate Sediment* because 1) no suction dredging is proposed, 2) no other inchannel activity is proposed, and 3) the potential inputs of fine sediment would be small and would move through the system as suspended load and not alter the substrate.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes would occur in *Lower Bank Angle* for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes would occur in *Width/Depth ratio* because there would be 1) no change to *Bank Stability* and therefore channel widths and 2) no instream activity which could trigger a headcut and alter channel depths.

**Wetlands and Floodplains**

No activity is proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

<u>Stream flow alteration potential at Site B</u>

There is a potential water quality impact to stream temperatures downstream if the test hole at Site B reverses groundwater flow and causes a portion of the stream to go dry while the hole

was open. This effect does NOT fall under Section 401 of the CWA because it is a result of water removal NOT the result of something added to the stream. Flow was measured on several days by one of the Umatilla National Forest hydrologists. Values were as follows: April 23, 2002 (126 cfs) measured at the junction of the FS road 1000 and 1031, September 2, 2005 (4.33 cfs) at the confluence of Granite Creek and Clear Creek, and October 26, 2007 (5.31 cfs) upstream of the Black Jack adit (E. Farren, Umatilla National Forest, email, 8/12/13). *Grubsteak* is located upstream of Beaver Creek and Olive Creek tributaries, so the flows in this portion of Clear Creek are expected to be lower than the values presented above.

The reasons for the potential reversal of flow are as follows: The proposed test hole would be less than 50 feet from Clear Creek, would be 10 to 12 feet deep and 20 to 25 feet in diameter. The area of the creek and side channel has been previously mined. Thus many of the fines have been removed from the channel sediments and the permeability of the buried sediment is expected to be high. A hole 10 to 12 feet deep would be below the elevation of the Clear Creek channel bed. It is possible this activity would change the direction of groundwater flow so that water moves from the creek into the hole and a portion of the creek would go dry or noticeably shallow. A reduction of flow has the potential to locally contribute to increased stream temperatures downstream. Therefore, under Alternative 2, the Plan would not be in compliance with the John Day Basin TMDL.

# ALTERNATIVE 3

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Site A*

Same as Alternative 2. No potential for a discharge.

*Site B*

Different than Alternative 2. Under Alternative 3, the discharge potential related to mining activity at this site **would be eliminated** as a result of two Forest Service WRPMs (Appendix 1A). One WRPM clarifies the starting point of the buffer measurement. This WRPM, which clarifies the Plan-specific buffer , places mining activity clearly on flat ground and 20 foot between the bank edge and mining activity. The second WRPM restricts the makeup of the berm to straw bales/coils rather than a berm composed of gravels, straw bales and filter cloth. These two Forest Service WRPMs ensure effective sediment trapping mechanisms between the mining site and the creek such that no sediment generated by the mining activity would reach

the creek. Ground cover on the flat valley floor where site B is located is about 50 to 70% and a mix of grasses, forbs and needles.

Ponds

*Source water pond and settling pond at Site A (same pond)*

Same as Alternative 2. No potential for a discharge.

*Proposed settling ponds*

Different than Alternative 2. Under Alternative 3, no potential for a discharge as a result of the addition of Forest Service WRPM (Appendix 1A) which requires that the ponds be location with Forest Service input and protection measures identified and implemented.

Fords

Different than Alternative 2. Under Alternative 3, the discharge potential from use of the existing ford via temporary access road 1300-1Ma **would be eliminated** because of the addition of Forest Service WRPM (Appendix 1A) which states that the southwest approach to the ford would be rocked. This WRPM would bury the fine sediments and eliminate the source of sediment that could easily reach the creek.

Bridges

One existing wooden bridge is proposed for use. Same as Alternative 2. No potential for a discharge.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No potential for a discharge

**Clean Water Act, Section 303(d)** (antidegradation)

Clear Creek is not 303(d) listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) one existing pond which serves as both source water and settling pond, 2) several proposed ponds, 3) one existing TA road, and 4) existing bridge.

Ponds

*Existing pond (serves as both source water and as a settling pond)*

Same as Alternative 2. Use of the pond as both a source water and settling pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Proposed ponds*

Different than Alternative 2. Under Alternative 3, construction and use of these ponds would be in compliance with MM-2 as a result of the addition of Forest Service WRPMs (Appendix 1A). This WRPM requires that the miner locate these ponds with input from the Forest Service and the appropriate protection measures identified and implemented.

Access Roads

Same as Alternative 2. Use of the existing TA road would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Bridges

Same as Alternative 2. Use of the existing wooden bridge would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Different than Alternative 2. Under Alternative 3, the potential impact to *Water Temperature* **would be eliminated** as a result of the addition of a Forest Service WRPM (Appendix 1A). This WRPM requires that the miner monitor the amount of water that moves into the hole at Site B and limit further deepening once water starts entering the hole until Forest Service monitoring of Clear Creek and other protection measures are put into place to ensure that impacts to water temperature would not occur.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

Stream flow alteration potential at Site B:

Different than Alternative 2. Under Alternative 3, the potential for a portion of the channel to go dry or flows to drop, leading to an increase of stream temperature downstream, **would be eliminated** by the addition of a Forest Service WRPM (Appendix 1A). This WRPM limits the amount of water that would be allowed to move into the hole before additional Forest Service WRPMs are identified. Therefore, under Alternative 3, the Plan would now be in compliance with the John Day Basin TMDL.

# Hopeful 1

**Plan type**: Placer
**Subwatershed:** Lower Granite Creek (HUC 170702020206)
**Subwatershed size:** 20,282 acres
**Analysis area:** 1 acre
**Creek**: Granite Creek (perennial flow and fish-bearing)
**Stream Order:** 6th
**303(d) listed:** Yes for sedimentation
**Suction Dredging:** No
**Essential Salmon Habitat:** Yes

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

No potential for a discharge via surface or subsurface flow as a result of the mining activity because the area is up on a terrace and about 150 feet from the creek.

Ponds

*Source water pond*

No potential for a discharge via surface or subsurface flow because only withdrawing water.

*Settling ponds*

No potential for a discharge via surface flow from the existing settling pond (a depression) into Granite Creek because the pond is an old test pit and separated from the creek by an 8 to 10 berm of old placer tailings.

No potential for a discharge via subsurface flow from the existing settling pond (a depression) into Granite Creek because the pond bottoms are vegetated with lush rushes, sedges and brush which are effective at trapping fine sediment.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

The miner proposes to use one Forest Service closed road and one existing temporary access road (1035-E2a) (Appendix 6). The roads have an aggregate surface. FS closed road 1035-012 is separated from the creek by more than 100 feet of forested ground. TA road 1035-E2a is separated from the creek by at least 100 feet of ground that is well vegetated with grasses and forbs. Therefore, no potential for a discharge as a result of using these two roads.

**Clean Water Act, Section 303(d)** (antidegradation)

Granite Creek is 303(d) listed for sedimentation by ODEQ. Sedimentation is defined by ODEQ as: "The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry…."

There would be no change in the existing water quality condition for which this stream is listed because no new sediment would be added to the stream from the mining-related activities.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) an existing source water pond, 2) an existing settling pond, 3) one Forest Service closed road and 4) one existing temporary access road.

Ponds

*Source water pond*

Use of the existing source water pond would be in compliance with MM-2 because the miner would only withdraw water. Therefore, no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation.

*Settling ponds*

Use of the settling ponds would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Access Roads

Use of the FS closed road and the existing TA road would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* No changes in *Pool Frequency* would occur as a result of the proposed activities for the following reasons: 1) There would be no sediment inputs related to the activities, 2) no changes to large woody recruitment are expected (see below), and 3) no suction dredging is proposed.

*Water Temperature:* No changes in *Water Temperature* would occur because 1) there would be no activity in the channel or on the stream banks which would alter channel width and therefore change flow depths for a given discharge, and 2) no trees are proposed for removal.

*Large Woody Debris:* No changes would occur in *Large Woody Debris* recruitment or existing wood in the stream because 1) no trees are proposed for removal and 2) there would be no activity in the channel to alter existing amounts and distributions.

*Substrate Sediment:* No changes in *Substrate Sediment* because 1) no suction dredging is proposed, 2) no other inchannel activity is proposed, and 3) no potential for a discharge of sediment from mining activities on land.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* would occur for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability* and therefore channel widths and 2) no instream activity would occur which could trigger a headcut and alter channel depths.

**Wetlands and Floodplains**

No activities are proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

Stream flow and stream temperature alteration related to water withdrawals

The miner proposes to use water from Granite Creek and an old dredge pond as source water for processing. Based on the equipment used, the pump would withdraw up to 40 gpm or 0.09 cfs. For the analysis below, it is assumed that all of the water withdrawn would come from Granite Creek because this assumption analyzes for the largest potential impact on the creek.

*Background*

The potential effects on stream flow and stream temperatures from withdrawing water from Granite Creek were assessed using 1) stream temperature data and 2) examination of several stream gages from the larger area to determine the timing of summer low flows. No water depths or stream flow data exist for Granite Creek.

a. Stream Temperatures

There are five stream temperature monitors (hobos) on Granite Creek (**Table 7-5**). The closest stream temperature data for Granite Creek is located below the confluence of Granite Creek and Bull Run Creek and is at least 6 miles upstream of Hopeful 1. The ODEQ stream temperature standard for Granite Creek is 53.6*F. The 7-day running average of the maximum daily stream temperatures for the years with data exceed ODEQ standard at both sites most years.

**Table 7-5**
**7-day running average of the maximum daily stream temperature on Granite Creek in the vicinity of Hopeful 1**

| 2010 NHD HUC 12 name | 2010 NHD HUC 12 | Creek | Hobo number | Survey Yr | District Av. 7 day | Elevation (ft) |
|---|---|---|---|---|---|---|
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.1 | 1995 | 68.24 | 4590 |
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.1 | 1997 | 69.09 | 4590 |
| | | | | | | |
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.2 | 1997 | 65.7 | 4655 |
| | | | | | | |
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.3 | 1996 | 61.7 | 4670 |
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.3 | 1997 | 62.2 | 4670 |

| 2010 NHD HUC 12 name | 2010 NHD HUC 12 | Creek | Hobo number | Survey Yr | District Av. 7 day | Elevation (ft) |
|---|---|---|---|---|---|---|
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.3 | 1998 | 65.5 | 4670 |
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.3 | 2002 | 63.8 | 4670 |
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.3 | 2003 | 63.97 | 4670 |
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.3 | 2005 | 61.26 | 4670 |
| | | | | | | |
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.4 | 1997 | 57.85 | 5006 |
| | | | | | | |
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.5 | 1998 | 57.09 | 5200 |
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.5 | 2005 | 54.39 | 5200 |

b. Water Depths

There are no water depths available for Granite Creek in the area of Hopeful 1.

c. Stream Flow

There are no stream gages on Granite Creek. Therefore, stream hydrographs from six stream gages around the area were examined for the period of June 10 through Sept 30 for 2007 and 2013 to determine when stream flows were reflecting groundwater inputs only (base flows) and would therefore be at their lowest (*project file)*. These years were selected because 2007 was a low flow year on some streams in the area and 2013 was selected because there was some point-in-time stream flow measurements made on other streams in the analysis area. Drainage areas for these stream gages ranged from 7 sq. miles up to 121 sq. miles.

While there was some variability between years and stations, stream low flows tend to occur between early to mid-July through early to late September. Therefore, any water withdrawals during this time would be occurring when the flows would be at their lowest.

Predictions regarding climate change for the Blue Mountains are for increased periods of drought, reductions in snowpacks, and a shift in the timing of peak flows to earlier in the year (Luce et al 2013; Science Briefing 2014). Under these conditions, stream flows are expected to decrease during the summer months, the initiation of summer low flows may occur sooner (i.e. from early-mid July to sometime in June), and stream temperatures may increase. An additional impact is that some streams may change from perennial to intermittent flow.

*Conclusions*

The available data show that stream temperatures exceed the ODEQ temperature standard. However, the miner proposes to withdraw no more than 40 gpm or 0.09 cfs from Granite Creek. Given the size of Granite Creek in the area of Hopeful 1, the withdrawal of 0.09 cfs would not have a measureable effect on stream flow or stream temperatures given the size of the stream flow compared to the amount proposed to be withdrawn. Therefore, under Alternative 2, the Plan would be in compliance with the John Day Basin TMDL.

# ALTERNATIVE 3

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

Same as Alternative 2. No potential for a discharge.

Ponds

*Source water pond*

Same as Alternative 2. No potential for a discharge

*Settling ponds*

Same as Alternative 2. No potential for a discharge

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No potential for a discharge

**Clean Water Act, Section 303(d)** (antidegradation)

Same as Alternative 2. Granite Creek is listed for sedimentation. There would be no change in the existing water quality condition for which this stream is listed because no new sediment would be added to the stream from the mining-related activities.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) an existing source water pond, 2) an existing settling pond, 3) one Forest Service closed road and 4) one existing temporary access road.

Ponds

*Source water pond*

Same as Alternative 2. Use of the existing source water pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Settling ponds*

Use of the existing settling pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Access Roads

Same as Alternative 2. Use of the FS closed road and the existing TA road would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**
Same as Alternative 2. No changes in the RMO parameters.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

Stream flow and stream temperature alteration related to water withdrawals

Same as Alternative 2. The impact of withdrawing water from Granite Creek on stream flow or stream temperatures would not be measureable given the scale of the stream flow compared to the amount proposed to be withdrawn. Therefore, the Plan would be in compliance with the John Day Basin TMDL.

# Hopeful 2, 3

**Plan type**: Placer
**Subwatershed:** Lower Granite (HUC 170702020206)
**Subwatershed size:** 20,282 acres
**Analysis area:** 3.5 acres
**Creek**: Granite Creek (perennial flow and fish bearing)
**Stream Order:** 6th
**303(d) listed:** Yes for sedimentation
**Suction Dredging:** No
**Essential Salmon Habitat:** Yes

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Mining Site #1 (north side)*

There would be no potential for a discharge of sediment because the mining site is at least 45 feet from the creek and the area between the creek and the mining area is forested. The forested ground is an effective sediment trap should any sediment leave the mining site.

*Mining Site #3 (north side)*

No potential for a discharge because the area to be mined is at least 48 feet (paced) from the creek and is separated from the creek by 1) an old ditch and 2) a road. Therefore, any sediment generated by the mining activity would be effectively trapped in the ditch and road before it could reach the creek.

*Mining Site #4 (south side)*

No potential for a discharge because the area to be mined is at least 25 feet from the creek and is separated from the creek by 1) a road and 2) forested ground. The road and the forested ground are both effective sediment traps. Therefore any sediment generated by the activity that left the site would be trapped prior to reaching the creek.

Ponds

**FS NOTE:** The Plan states that the processing sites are at least 50 feet from the creek. Both processing sites are ACTUALLY less than 50 feet from the creek. Each pond would be used as both the source water pond and the settling pond for the site.

*North processing site (2 proposed ponds)*

*Source water pond related*

Pond construction*:* Potential for a discharge of sediment via surface flow during construction because the edge of the terrace is only 7 feet away and then it drops down to the active floodplain.

Pond use: No potential for a discharge related to use of the pond for source water because the miner would only be withdrawing water.

*Settling pond related*

Pond construction*:* Potential for a discharge of sediment via surface flow during construction because the edge of the terrace is only 7 feet away and then it drops down to the active floodplain.

Pond use*:* Potential for a discharge of sediment via surface flow because because the edge of the terrace is only 7 feet away and then it drops down to the active floodplain and there is a small swale at the edge of the terrace by the settling pond area that would funnel any surface water that exited the settling pond onto the floodplain.

*South Processing site (one pond)*

*Source water pond*

This pond would serve as both source water pond and settling pond.

No potential for a discharge via surface or subsurface flow from the existing pond because the miner would only be withdrawing water.

*Settling ponds*

No potential for a discharge via surface or subsurface flow from the pond into Granite Creek (when used as a settling pond) because the pond is well sealed and has a tall, well-constructed and stable berm that separates it from Granite Creek.

Fords

**FS NOTE:** There are two existing fords proposed for use in the Plan but correspondence with the miner indicates that he intends to only use the existing east ford.

The miner has stated that in his Plan that "mitigation measures recommended by the Forest Service concerning the fords will be implemented (p. 5)." Therefore, discussion of discharge potential related to use of the ford occurs only under Alternative 3.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Miner proposes to use four existing Temporary Access roads (Appendix 6).
Two of the mine access roads have an aggregate surface (1035-E1a and 1035-E1b). The other two mine access roads have a native surface (1035-E1c and 1035-E1d). All roads are separated from the creek by vegetated ground except at the ford which is addressed above. The ground cover would effectively trap any sediment that would leave the road prior to it reaching the creek.

**Clean Water Act, Section 303(d)** (antidegradation)

Granite Creek is 303(d) listed for sedimentation by ODEQ. Sedimentation is defined by ODEQ: "The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry…."

The activities proposed in this Plan would not alter the existing water quality condition despite the potential inputs of fine sediment because the sediment would move through the system either as suspended load if silts and clays or be deposited within 50 feet if sands and gravels

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) construction and use of two proposed ponds on the north side of Granite Creek (*North processing site*), 2) one existing pond on the south side of Granite Creek (*South processing site*), and 3) four existing temporary access roads.

North processing site (2 proposed ponds)

Two proposed ponds. One would serve as source water pond and the other as a settling pond.

*Source water Pond*

Construction*:* Pond construction would NOT be in compliance with MM-2 because there is the potential for a discharge of sediment via surface flow because the edge of the terrace is only 7 feet away and then it drops down to the active floodplain.

Use*:* Use of the source water pond would be in compliance with MM-2 because water would only be withdrawn.

*Settling Pond*

Construction: Pond construction would NOT be in compliance with MM-2 because there is the potential for a discharge of sediment via surface flow because the edge of the terrace is only 7 feet away and then it drops down to the active floodplain.

Use: Use of the settling pond would NOT be in compliance with MM-2 because there is the potential for a discharge of sediment via surface flow because the edge of the terrace is only 7 feet away and there is a small swale at the edge of the terrace by the settling pond area that would funnel any surface water that exited the settling pond onto the floodplain.

*South processing site (one existing pond)*

The existing pond would serve as both source water pond and settling pond. It currently contains water.

*Source water pond*

Use of the pond would be in compliance with MM-2 because the miner would only be withdrawing water. Therefore no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation.

*Settling ponds*

Use of the pond would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Access Roads

There are four existing TA roads proposed for use. All TA roads except TA road 1035-E1d would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

TA road 1035-E1d would NOT be in compliance with MM-2 because there is the potential for a discharge of sediment. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* No changes in *Pool Frequency* would occur as a result of the proposed activities for the following reasons: 1) The potential inputs of fine sediment under Alternative 2 would be small and move through the system as suspended load, 2) no changes to large woody recruitment are expected (see below), and 3) no suction dredging is proposed.

*Water Temperature:* No changes in *Water Temperature* would occur because 1) there would be no activity in the channel or on the stream banks which would alter channel width and therefore change flow depths for a given discharge, and 2) there would be only very limited removal of trees, none of which would be shade trees.

*Large Woody Debris:* No changes would occur in *Large Woody Debris* recruitment or existing wood in the stream because 1) the only places where trees would be cut are on the north and south sides where mining would occur, and neither of these areas are wood recruitment sources (small saplings occur along the existing miner access road on the south side), and 2) there would be no activity in the channel to alter existing amounts and distributions.

*Substrate Sediment:* No changes in *Substrate Sediment* because 1) no suction dredging is proposed, 2) no other inchannel activity is proposed, and 3) the potential inputs of fine sediment from Site 2 on the north side would be small and would move through the system as suspended load and not alter the substrate.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* would occur for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability* and therefore channel widths and 2) no instream activity which could trigger a headcut and alter channel depths.

**Wetlands and Floodplains**

No activity is proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# ALTERNATIVE 3
# Water Resources
## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Mining Site #1*

Same as Alternative 2. No potential for a discharge.

*Mining Site #3*

Same as Alternative 2. No potential for a discharge.

*Mining Site #4*

Same as Alternative 2. No potential for a discharge.

Ponds

*North processing site (2 proposed ponds)*

***Source water pond***

*Construction:* Different from Alternative 2. Under Alternative 3, the discharge potential of sediment **would be eliminated** with the addition of Forest Service WRPMs (Appendix 1A). These WRPMs would require effective sediment traps to prevent any sediment from exiting the terrace and ending up on the active floodplain.

*Use:* Same as Alternative 2. No potential for a discharge.

***Settling pond related***

*Construction and Use:* Different from Alternative 2. Under Alternative 3, the discharge potential of sediment **would be eliminated** with the addition of Forest Service WRPMs

(Appendix 1A). These WRPMs would require effective sediment traps to prevent any sediment from exiting the terrace and ending up on the active floodplain.

*South processing site (one existing pond)*

Same as Alternative 2. No potential for a discharge.

Fords

One existing ford proposed for use via temporary access roads 1035-E1b and 1035-E1d.

*East ford*

There is no discussion under Alternative 2 regarding discharge related to use of this existing ford because the miner deferred to the Forest Service with respect to any protection measures. Therefore, this ford is discussed only under Alternative 3.

Under Alternative 3, no potential for a discharge as a result of the addition of a Forest Service WRPM (Appendix 1A). This WRPM would require that both ford approaches be rocked. Rocking would effectively eliminate the input of the fine sediment into Granite Creek.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Different than Alternative 2. No potential for a discharge as a result of the addition of Forest Service WRPMs to TA 1035-E1d.

**Clean Water Act, Section 303(d)** (antidegradation)

Same as Alternative 2. Granite Creek is listed for sedimentation and the activities proposed in this Plan would not alter the existing water quality condition for which this stream is listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) one existing pond on the south side of Granite Creek, 2) proposed construction and use of two ponds on north side of Granite Creek, and 3) four existing temporary access roads.

*North processing site (2 proposed ponds)*

***Source water pond***

Same as Alternative 2. Use of the pond as a source water pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

***Settling ponds***

Same as Alternative 2. Use of the pond as a settling pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*South processing site (one existing pond)*

Existing pond would serve as both source water pond and settling pond.

*Source water pond*

Same as Alternative 2. Use of the pond as a source water pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Settling pond*

Same as Alternative 2. Use of the pond as a settling pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Access Roads

Different than Alternative 2. Under Alternative 3, all of the existing TA roads proposed for use would be in compliance with MM-2 as a result of the addition of Forest Service WRPMs to TA 1035-E1d. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. No changes in the RMO parameters.

**Wetlands and Floodplains**

Same as Alternative 2. No activity is proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# L & H

**Plan type**: Placer and Lode
**Subwatershed:** Beaver Creek (HUC 170702020203)
**Subwatershed size:** 13,075 acres
**Analysis area:** 8 acres
**Creek**: Olive Creek (intermittent flow and non fish-bearing)
**Stream Order:** 1st
**303(d) listed:** No
**Suction Dredging:** No
**Essential Salmon Habitat:** No

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Placer mining*

No potential for a discharge because the placer activity would occur in an area that was historically hydraulically mined and the drainage in this area no longer has a defined channel.

*Lode mining*

Potential for a discharge of heavy metals in solution and sediment via surface flow related to proposed reclamation for adit 3. The miner proposes to put the waste rock back into the adits once milled. Adit 3 currently discharges water and is adjacent to Olive Creek. The waste rock may contain heavy metals and heavy metal concentrations in the adit discharge water would increase as groundwater flowed through the waste material and then entered Olive Creek. The other two adits are dry, up on a hillslope and are separated from Olive Creek by a road.

Ponds

No discharge potential. The existing L & H ponds are outside the RHCAs of any streams.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Miner proposes to use two existing Temporary Access roads (Appendix 6). The mine access roads are native surface roads.

*TA Road 1305-E5a*

No potential for a discharge related to use of this road because there are not channels in this area, as the area has been hydraulically mined. In addition, the road is about 90 feet from the drainage.

*TA Road 1305-E5b*

No potential for a discharge related to use of this road because the road is a short spur that accesses Adit 3, and is separated from Olive Creek by about 70 feet of forested ground. The ground cover in this area is sufficient to effectively trap any sediment that would leave the road prior to its reaching the creek.

**Clean Water Act, Section 303(d)** (antidegradation)

Olive Creek is not listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are two existing temporary access (TA) roads. The ponds are outside the RHCA and therefore not evaluated for compliance with MM-2.

Access Roads

Use of the existing TA roads would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* No changes in *Pool Frequency* would occur as a result of the proposed activities for the following reasons: 1) no sediment would enter the channel under Alternative 2, 2) only limited trees would be removed from the area, and 3) no suction dredging is proposed.

*Water Temperature:* No changes in *Water Temperature* would occur because 1) there would be no activity in the channel or on the stream banks which would alter channel width and therefore change flow depths for a given discharge, and 2) there would be only very limited removal of trees, none of which would be shade trees.

*Large Woody Debris:* No changes would occur in *Large Woody Debris* recruitment or existing wood in the stream because 1) the only places where trees would be removed is from the rock piles at the east end of the cabin and a few from the area around the portal (adit 3) so that the backhoe can access the adit, and 2) there would be no activity in the channel to alter existing amounts and distribution.

*Substrate Sediment:* No changes in *Substrate Sediment* because 1) no suction dredging is proposed, 2) no other inchannel activity is proposed, and 3) no potential for a discharge of sediment from mining activities on land.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* would occur for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability* and therefore channel widths and 2) no instream activity which could trigger a headcut and alter channel depths.

**Wetlands and Floodplains**

No activity is proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# ALTERNATIVE 3

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Placer mining*

Same as Alternative 2. No potential for a discharge.

*Lode mining*

Different than Alternative 2. Under Alternative 3, the discharge potential of heavy metals in solution and sediment via surface flow **would be eliminated** as a result of the addition of Forest Service General Requirements L3, 4, 5 and 8 (Appendix 2) and Forest Service WRPMs (Appendix 1A). The Forest Service General Requirements L3 and L4 require that the first run of any lode material, as well as any water discharging from the adit, be tested for heavy metals. If a dry adit began to discharge water, the Forest Service would be notified and the water be required to be tested prior to further activity (L8). General Requirement L5 states that test results must be submitted to the Forest Service. If heavy metals were above what was allowed by the State, then the miner would cease operation of this portion of their activity and submit a supplement to the Forest Service for analysis.

The Forest Service WRPM is specific to adit 3 activity. It prevents the miner from returning the milled waste rock back into adit 3 where it can interact with adit water which is discharging into Olive Creek.

Ponds

Same as Alternative 2. No potential for a discharge.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No potential for a discharge.

**Clean Water Act, Section 303(d)** (antidegradation)

Olive Creek is not 303(d) listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are two existing temporary access roads. The ponds are outside the RHCA and therefore not evaluated for compliance with MM-2.

Access Roads

Same as Alternative 2. Use of the existing TA roads would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. No changes in the RMO parameters.

**Wetlands and Floodplains**

Same as Alternative 2. No activity is proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# Lightning Creek

**Plan type**: Placer
**Subwatershed:** Clear Creek (HUC 170702020204)
**Subwatershed size:** 20,467 acres
**Analysis area:** 5 acres
**Creek**: Lightning Creek (perennial flow and fish bearing)
**Stream Order:** 2nd
**303(d) listed:** No
**Suction Dredging:** Yes
**Essential Salmon Habitat:** Yes

## ALTERNATIVE 2
## Water Resources
### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

No potential for a discharge into Lightning Creek from mining activity because the area proposed for mining is 150 feet from the creek and the ground has mixed topography with some areas with tailings piles and other areas with flat ground.

Ponds

*Source water pond*

No potential for a discharge via surface or subsurface flow because withdrawing water directly from Lightning Creek.

*Settling ponds*

No potential for a discharge via surface flow from use of the existing ponds into Lightning Creek because the ponds are old dredge ponds and separated from the creek by 50 to 75 feet.
No potential for a discharge subsurface flow from use of the existing ponds because the pond bottoms are vegetated with lush rushes, sedges and brush which are effective at trapping fine sediment and the ponds are at about the same elevation level as the stream.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Bridges

An existing wooden bridge across Lightning Creek is proposed for use. Bridge would be used for regular vehicle traffic (i.e. ATV, pickup truck). No potential for a discharge of sediment as a result of use because bridge is existing and stable and no bridge modifications planned.

> **FS NOTE**: Heavy equipment would be moved across Lightning Creek via the ford on an open road

.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Miner proposes to use two existing Temporary Access roads (Appendix 6).

*TA road 1305-E6a*

No potential for a discharge related to use of this road because 1) the road is across flat ground, 2) is at least 50 feet from the creek, and 3) separated from the creek by a low berm of old placer tailings. Therefore any sediment generated as a result of use of this road would be trapped by the berm and the flat ground prior to reaching the creek.

*TA road 1305-E6b*

No potential for a discharge related to use of this road because 1) it is almost 400 feet from the creek, and 2) separated from the creek by road 1305-E6a, old dredge ponds, the berm and areas of flat ground. Therefore, any sediment generated as a result of use of this road would be effectively trapped prior to reaching the creek.

**Clean Water Act, Section 303(d)** (antidegradation)

Lightning Creek is not listed.

**Suction Dredging**

Suction dredging is permitted under the ODEQ 700PM permit (Appendix 4A). This permit has a series of requirements for dredging in any stream with additional requirements for dredging in essential salmon habitat. Lightning Creek is essential salmon habitat and therefore all aspects of the 700PM permit apply.

In evaluating suction dredging on Lightning Creek in the area of the proposed operation impacts to the following parameters were considered: pool frequency and distribution, habitat complexity (e.g. log jams, instream wood, beaver dams), stream temperatures, turbidity, and

substrate, and channel bed stability (Appendix 4B, 4C). The analysis assumes that the miners would be in compliance with the 700PM permit (Appendix 4A) and all its requirements.

Site Characteristics

The channel bed in this area is predominantly cobbles with some gravels and sands and highly stable given the abundance of cobbles. Lightning Creek was historically placer mined and therefore, the percentage of the silts and clays in the channel bed is expected to be limited. The only source of abundant fine-grained material would be the stream banks. However, no mining or destabilizing of the stream banks is permitted under the 700PM permit (Schedule C.5, 6, 7 and 8).

Water Quality and Channel Morphology analysis

*Pool frequency and distribution:* Localized changes would occur in pool frequency and locations related to suction dredging as dredging will create pools and loosen the substrate. The pool created by suction dredging is likely to be permanent because the amount of bedload moving through the stream is limited, and the sediment disturbed by suction dredging would be redistributed downstream during high flow events.

*Habitat complexity*: Potential local changes would occur in habitat complexity because boulders and habitat structures may be moved around in the stream but not removed. Therefore, the impacts of suction dredging on in-channel habitat complexity may occur but should be limited to small areas. The changes would be permanent

Schedule C.6 prohibits removing or disturbing boulders, rooted vegetation, or embedded woody plants and other habitat structures from the stream banks. Habitat connected to the stream banks (beaver dams, undercuts, root wads etc.) therefore would remain intact thereby ensuring that some key habitat types would not be modified.

*Stream temperatures*: No changes to stream temperatures would occur because suction dredging would not alter stream channel widths, channel depths, remove stream side shade or alter groundwater flows.

*Turbidity*: Local change would occur in water clarity as represented by changes in turbidity. Turbidity could extend beyond the immediate area that is dredged, but under the 700 PM permit, changes in water clarity are not allowed to extend beyond 300 feet downstream. However, given the past history of placer mining in this stream, fines are expected to be limited in the channel bed, and therefore the turbidity plume is expected to dissipate much sooner than 300 feet downstream. In addition, the turbidity plume would only occur when dredging is occurring. Therefore, the temporal impact is limited to the when the miner is suction dredging.

*Substrate:* Local changes in channel bed substrate are expected as a result of suction dredging. Dredging would pull sediment from the channel bed, pass it up through a suction

hose, and run it across a recovery system (sluice box) floating at the surface. The gravel and other material, which washes through the recovery system, would then be washed back into the stream. Pools would be created where the sediment was pulled from and small dredge tailings piles created where the gravel and other material was deposited. In some cases the gravel and other material would be put back into the pool and in other cases deposited in the channel but not in the pool. These dredge tailings would be mobilized during the spring high flow and redistributed downstream. The changes in substrate at the dredge pool location would be permanent but highly localized.

*Channel bed stability*: No changes to channel bed stability would occur, even though dredging will create pools because the channel bed is composed of cobbles, sand and gravel. Therefore, no headcutting and bed destabilization is expected to occur.

Summary of Effects

The analysis found that suction dredging would have no impact on 1) stream temperature or 2) channel bed stability for the reasons stated above. Suction dredging would have a local impact on 1) pool frequency and distribution, 2) habitat complexity, 3) turbidity and 4) substrate for the reasons stated above. The changes to pool frequency, habitat complexity and substrate are expected to be permanent but limited to the area worked and therefore would not have a measurable impact on channel complexity or channel stability. Changes in turbidity would impact less than 300 feet of stream and not be permanent but limited to the period of time that the miner is suction dredging.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) existing ponds, 2) proposed ponds, 3) one existing temporary access (TA) road (1305-E6a), and 4) an existing bridge TA road 1305-E6b is outside the RHCA and therefore not evaluated for compliance with MM-2.

Existing Ponds

*Source water pond*

Use of the existing source water pond would be in compliance with MM-2 because the miner would only be withdrawing water. Therefore, no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*Settling ponds*

Use of the existing ponds for settling ponds would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Proposed Pond

*Source water pond*

No new source water pond.

*Settling ponds*

Construction and use of the settling pond would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Access Roads

Use of existing TA road 1305-E6a would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Bridges

One existing wooden bridge which spans Lightning Creek is proposed for use. Same as Alternative 2. No potential for a discharge.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* Localized changes would occur in pool frequency and locations related to suction dredging as dredging will create pools and loosen the substrate. The pool created by suction dredging is likely to be permanent because the amount of bedload moving through the stream is limited and the sediment disturbed by suction dredging would be redistributed downstream during high flow events.

No changes would occur to pool frequency related to potential for inputs of fine sediment from use of the ford because inputs would move through the system as suspended load and not settle out in the pools. There would be no changes in pool frequency related to *Large Woody Recruitment* because no trees are proposed for removal.

*Water Temperature:* No changes would occur in *Water Temperature* because 1) no shade trees would be removed, and 2) suction dredging would occur under the requirements established in the ODEQ 700 PM permit which would ensure that there would not be increases in stream channel widths or channel depths which would alter water depths and influence stream temperatures (Appendix 4A).

*Large Woody Debris:* No changes would occur in *Large Woody Debris* recruitment or existing wood in the stream because 1) the only place where trees might be removed is the testing areas and these are more than 150 feet from the creek, and 2) suction dredging would occur under the requirements established in the ODEQ 700 PM permit. Schedule C.6, 7, and 8 of the permit limits the amount of instream habitat structures that can be moved or altered (Appendix 4A).

*Substrate:* Local changes in channel bed substrate are expected as a result of suction dredging. Dredging would pull sediment from the channel bed, pass it up through a suction hose, and run it across a recovery system (sluice box) floating at the surface. The gravel and other material, which washes through the recovery system, would then be washed back into the stream. Pools would be created where the sediment was pulled from and small dredge tailings piles created where the gravel and other material was deposited. In some cases the gravel and other material would be put back into the pool and in other cases deposited in the channel but not in the pool. These dredge tailings would be mobilized during the spring high flow and redistributed downstream. The changes in substrate at the dredge pool location would be permanent but highly localized.

No changes would occur to substrate sediment as a result of potential for inputs of fine sediment related to mining activity because inputs would move through the system as suspended load.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* would occur for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be no change to *Bank Stability* as a result of mining activity or suction dredging because, 1) no mining activity is proposed on the stream banks and 2) suction dredging would occur under the requirements established in the ODEQ 700 PM permit (Appendix 4A). In addition, the existing channel bed is composed of a mix of cobbles, sands and gravels and highly stable. Therefore, there would be no potential for suction dredging to trigger a headcut and increase channel depth.

**Wetlands and Floodplains**

No activity is proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

Stream flow and stream temperature alteration related to water withdrawals

The Plan proposes to use withdraw water from Lightning Creek and use as source water for processing placer material. Based on the equipment proposed for use, the pump would withdraw approximately 100 gallons per minute or 0.2 cfs. This is the withdrawal amount that is analyzed below for effects.

*Background*

The potential effects on stream flow and stream temperatures from withdrawing water from Lightning Creek were assessed using 1) stream temperature data, 2) water depths taken during the stream flow measurement and at the one of the stream temperature monitors (hobos) sites, 3) a stream flow measurement from July 19, 2013, and 4) examination of several stream gages from the larger area to determine the timing of summer low flows which are the result of only groundwater inputs.

a. Stream Temperatures

There are two stream temperature monitors (hobos) on Lightning Creek. The ODEQ stream temperature standard for Lightning Creek is 53.6*F. The 7-day running average of the maximum daily stream temperatures for the years with data exceed ODEQ standard at both sites (**Table 7-6**).

**Table 7-6**
**7-day running average of the maximum daily stream temperature on Lightning Creek. LIGHTApl is located upstream of the Lightning Creek operation**

| 2010 NHD HUC 12 name | 2010 NHD HUC 12 | Creek | Hobo number | Survey Yr | District Av. 7 day | Elevation (ft) |
|---|---|---|---|---|---|---|
| Clear | 170702020204 | Lightning | LIGHTACC | 2000 | 64 | 5240 |
| Clear | 170702020204 | Lightning | LIGHTACC | 2001 | 65 | 5240 |
| Clear | 170702020204 | Lightning | LIGHTACC | 2002 | 65 | 5240 |
| Clear | 170702020204 | Lightning | LIGHTACC | 2003 | 66 | 5240 |
| Clear | 170702020204 | Lightning | LIGHTACC | 2004 | 63 | 5240 |
| Clear | 170702020204 | Lightning | LIGHTACC | 2005 | 63 | 5240 |
| Clear | 170702020204 | Lightning | LIGHTACC | 2006 | 63 | 5240 |
| | | | | | | |
| Clear | 170702020204 | Lightning | LIGHTAPL | 1997 | 56 | 5520 |
| Clear | 170702020204 | Lightning | LIGHTAPL | 1998 | 57 | 5520 |
| Clear | 170702020204 | Lightning | LIGHTAPL | 2000 | 56 | 5520 |
| Clear | 170702020204 | Lightning | LIGHTAPL | 2001 | 59 | 5520 |

| 2010 NHD HUC 12 name | 2010 NHD HUC 12 | Creek | Hobo number | Survey Yr | District Av. 7 day | Elevation (ft) |
|---|---|---|---|---|---|---|
| Clear | 170702020204 | Lightning | LIGHTAPL | 2002 | 59 | 5520 |
| Clear | 170702020204 | Lightning | LIGHTAPL | 2003 | 60 | 5520 |
| | | | | | | |

b. Water Depths

Water depths at the point where the July 19, 2013 stream flow measurement was taken varied from 2 to 13 inches. Water depth at the place where hobo LightApl was located in 2013 was about 12 inches deep that day. The hobo was about 20 feet downstream of the flow measurement (D. Robison, UNF, email comm. 3/13/14).

c. Stream Flow

There are no stream gages on Lightning Creek. Therefore, stream hydrographs from six stream gages around the area were examined for the period of June 10 through Sept 30 for 2007 (a low flow year) and 2013 to look for patterns of flow (*project file)*. Drainage areas for these stream gages ranged from 7 sq. miles up to 121 sq. miles. The stream hydrographs were examined to determine when stream flows were reflecting groundwater inputs only (base flows) and would therefore be at their lowest. While there was some variability between years and stations, stream low flows tend to occur between early to mid-July through early to late September. Therefore, any water withdrawals during this time would be occurring when the flows would be at their lowest.

Predictions regarding climate change for the Blue Mountains are for increased periods of drought, reductions in snowpacks, and a shift in the timing of peak flows to earlier in the year (References). Under these conditions, stream flows are expected to decrease during the summer months, the initiation of summer low flows may occur sooner (i.e. from early-mid July to sometime in June), and stream temperatures may increase. An additional impact is that some streams may change from perennial to intermittent flow.

A point-in-time (instantaneous) stream flow measurement was made on July 19, 2013 by Umatilla National Forest personnel just above the Lightning operation. The stream flow was 6.8 cfs with water depths ranging from 2 to 13 inches across the stream. At this flow volume, the amount proposed for removal by the miner (0.2 cfs) would be three percent of the flow. In a drought year or with extended drought, summer low flows are expected to be less making the amount withdrawn (0.2 cfs) a greater percentage of the total flow.

*Conclusions*

The available data show that currently stream depths are low in the summer and stream temperatures on Lightning Creek exceed the ODEQ temperature standard. Stream flow on July 19, 2013 was 6.8 cfs with water being contributed from several tributaries. At 6.8 cfs flow level,

no measurable increase in stream temperatures or reductions in flow would be expected if the miner withdrew up to 0.2 cfs during the summer. However, the predicted changes in climate could create site conditions in which the withdrawal would 1) increase stream temperatures downstream, 2) decrease water depths downstream, and/or 3) dry up the stream below the operation. Therefore, under Alternative 2, the Plan would not be in compliance with the John Day Basin TMDL.

# ALTERNATIVE 3
## Water Resources
### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

Same as Alternative 2. No potential for a discharge.

Ponds

Same as Alternative 2. No potential for a discharge.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Bridges

Same as Alternative 2. No potential for a discharge.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No potential for a discharge.

**Clean Water Act, Section 303(d)** (antidegradation)

Lightning Creek is not 303(d) listed.

**Suction Dredging**

Same as Alternative 2. The analysis found that suction dredging would have no impact on stream temperature or channel bed stability for the same reasons stated under Alternative 2.

Suction dredging would have localized and permanent impacts related to pool frequency and distribution, habitat complexity and substrate and localized but short-term impacts to turbidity for the same reasons stated under Alternative 2.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) existing ponds, 2) proposed ponds, 3) one existing temporary access (TA) road (1305-E6a) and 4) one existing bridge. TA road 1305-E6b is outside the RHCA and therefore not evaluated for compliance with MM-2.

Existing Ponds

*Source water pond*

Same as Alternative 2. Use of the existing source water pond would be in compliance with MM-2 because would only be withdrawing water. See Appendix 3 for detailed discussion.

*Settling ponds*

Same as Alternative 2. Use of the ponds would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Proposed Pond

*Source water pond*

No new source water pond.

*Settling ponds*

Same as Alternative 2. Construction and use of the settling pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Bridges

Same as Alternative 2. Use of the existing wooden bridge would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Access Roads

Same as Alternative 2. Use of existing TA road 1305-E6a would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. Only *Pool Frequency* and *Substrate Sediment* have the potential to be affected as a result of suction dredging. The changes would be permanent but localized to the area dredged and there would be no measurable changes to these inchannel characteristics even within the Plan analysis area.

**Wetlands and Floodplains**

Same as Alternative 2. No activity is proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

Stream flow and stream temperature alteration related to water withdrawals

Different than Alternative 2. There is a reduction in the time frame of potential effects related to water withdrawals as a result of the addition of two Forest Service Fish Protection Measures (Fish PMs) which listed under the Forest Service WRPMs (Appendix 1A). Under these Fish PMs, water can only be withdrawn from Lightning Creek 1) prior to August 15 and 2) if there is stream flow below the area being worked prior to and after water is withdrawn. Therefore, potential effects to stream temperatures and stream flow would occur for a shorter period (early-mid July through August 14) rather than early-mid July through September 30). However, withdrawals would still occur during the period when stream temperatures are the highest (Appendix 5C) and water depths and stream flows are the lowest. Water withdrawals, under certain flow condition, prior to August 14 would still have the potential to 1) increase stream temperatures downstream, 2) decrease water depths downstream, and/or 3) dry up the stream below the operation, just for a shorter period of time than in Alternative 2. Therefore, despite the addition of Forest Service Fish PMs and WRPMs, the Plan would still not be in compliance with the John Day Basin TMDL.

# Little Cross

**Plan type**: Placer
**Subwatershed:** Lower Granite (HUC 170702020206)
**Subwatershed size:** 20,282 acres
**Analysis area:** 1 acre but area worked is less than ¼ acre
**Creek**: Granite Creek (perennial flow and fish bearing)
**Stream Order:** 5th
**303(d) listed:** Yes for sedimentation
**Suction Dredging:** Yes
**Essential Salmon Habitat:** Yes

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)
Mining Activity

Potential for a discharge of sediment via surface and subsurface flow because the mining hole (also processing pond) would be in a road that slopes into Granite Creek. The test hole would be dug into a road which slopes directly into the creek, and the hole would be 15 to 20 feet at most from the creek. In addition, the permeability of the sediments is expected to be high as the site is in old placer mining tailings. Therefore, water in the test hole (processing pond) has the potential to create a seepage zone in the road, and in the process remobilize the fine sediment on the surface of the road which could then enter Granite Creek.

Ponds

The test hole would also be the source water pond and the settling pond. Hole would be located on the existing ford approach to Granite Creek.

*Construction:* Potential for a discharge via surface flow into the creek because the test hole/pond would be dug into a slope which feeds directly into the creek.

*Use as Source Water Pond:* No potential for a discharge related to use of the pond as a source water pond once constructed because the miner would only be withdrawing water.

*Use as Settling Pond:* Potential for a discharge via subsurface flow as a result of use of the pond as a settling pond because the hole is dug into old tailings and the permeability of the sediments is likely high. As a result, there would be the possibility that water in the hole could create a seepage zone in the road, and in the process remobilize fine sediment on the surface of the road. Because the hole is on a ford approach, sediment could move downslope into the creek.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Miner proposes to use one existing Temporary Access road (Appendix 6). Road 1000-E3a is 0.03 miles and composed of old placer tailings. The road is across flat ground and is within 50 feet of the creek at its closest point. The road is along flat ground and is separated from the creek by a berm composed of old placer tailings. The berm and the flat ground provide effective sediment traps, and therefore any sediment generated as a result of road that might erode off the road would be trapped prior to reaching the creek. Therefore, no potential for a discharge related to use of this road.

**Clean Water Act, Section 303(d)** (antidegradation)

Granite Creek is 303(d) listed for sedimentation by ODEQ. Sedimentation is defined by ODEQ as: "The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry…."

The activities proposed in this Plan would not alter the existing water quality condition for which this stream is 303(d) listed for the following reasons. First, there would be no potential for increased sedimentation from the proposed activities (including suction dredging) despite the potential inputs of fine sediment due to mining-related activities on land because the sediment would move through the system as suspended load and not settle out on the channel bed. Second, no new sediment would be added into the stream as a result of suction dredging. Instead, the substrate would simply be loosened and redistributed downstream during the spring high flows. The changes in substrate would be permanent but highly localized and restricted to the areas that are suction dredged.

**Suction Dredging**

Suction dredging is permitted under the ODEQ 700PM permit (Appendix 4A). This permit has a series of requirements for dredging in any stream with additional requirements for dredging in essential salmon habitat. Granite Creek is essential salmon habitat and therefore all aspects of the 700PM permit apply. While Granite Creek is 303d listed for sediment, suction dredging is grandfathered in on Granite Creek under Schedule C.19.

In evaluating suction dredging on Granite Creek in the area of the proposed operation, impacts to the following parameters were considered: pool frequency and distribution, habitat

complexity (e.g. log jams, instream wood, beaver dams), stream temperatures, turbidity, and substrate, and channel bed stability (Appendix 4B, 4C). The analysis assumes that the miners would be in compliance with the 700PM permit (Appendix 4A) and all its requirements.

Site Characteristics

The channel bed in this area is predominantly cobbles with some gravels and sands and highly stable given the abundance of cobbles. Granite Creek was historically placer mined and therefore, the percentage of the silts and clays in the channel bed is expected to be limited. The only source of abundant fine-grained material would be the stream banks. However, no mining or destabilizing of the stream banks is permitted under the 700PM permit (Schedule C.5, 6, 7 and 8).

Water Quality and Channel Morphology analysis

*Pool frequency and distribution:* Localized changes would occur in pool frequency and locations related to suction dredging as dredging will create pools and loosen the substrate. The pool created by suction dredging is likely to be permanent because the amount of bedload moving through the stream is limited and the sediment disturbed by suction dredging would be redistributed downstream during high flow events.

*Habitat complexity*: Potential local changes in habitat complexity would occur because boulders and habitat structures may be moved around in the stream but not removed. Therefore, the impacts of suction dredging on in-channel habitat complexity may occur, but would be limited to small areas. The changes would be permanent

Schedule C.6 prohibits removing or disturbing boulders, rooted vegetation, or embedded woody plants and other habitat structures from the stream banks. Habitat connected to the stream banks (beaver dams, undercuts, root wads etc.) therefore would remain intact, thereby ensuring that some key habitat types would not be modified.

*Stream temperatures*: No changes to stream temperatures would occur because suction dredging would not alter stream channel widths, channel depths, remove stream side shade or alter groundwater flows.

*Turbidity*: Potential local changes in water clarity would occur as represented by changes in turbidity. Turbidity could extend beyond the immediate area that is dredged but changes in water clarity are not allowed under the 700 PM permit to extend beyond 300 feet downstream. However, given the past history of placer mining in this stream, fines are expected to be limited in the channel bed and therefore the turbidity plume is expected to dissipate much sooner than 300 feet downstream. In addition, the turbidity plume would only occur when dredging is occurring. Therefore, the temporal impact is limited to the when the miner is suction dredging.

*Substrate:* Local changes in channel bed substrate are expected as a result of suction dredging. Dredging would pull sediment from the channel bed, pass it up through a suction hose, and run it across a recovery system (sluice box) floating at the surface. The gravel and other material, which washes through the recovery system, would then be washed back into the stream. Pools would be created where the sediment was pulled from and small dredge tailings piles created where the gravel and other material was deposited. In some cases the gravel and other material would be put back into the pool and in other cases deposited in the channel but not in the pool. These dredge tailings would be mobilized during the spring high flow and redistributed downstream. The changes in substrate at the dredge pool location would be permanent but highly localized.

*Channel bed stability*: No changes to channel bed stability would occur, even though dredging will create pools because the channel bed is composed of cobbles, sand and gravel. Therefore, no headcutting and bed destabilization is expected to occur.

Summary of Effects

The analysis found that suction dredging would have no impact on 1) stream temperature or 2) channel bed stability for the reasons stated above. Suction dredging would have a local impact on 1) pool frequency and distribution, 2) habitat complexity, 3) turbidity and 4) substrate for the reasons stated above. The changes to pool frequency, habitat complexity and substrate are expected to be permanent but limited to the area worked and therefore would not have a measurable impact on channel complexity or channel stability. Changes in turbidity would impact less than 300 feet of stream and not be permanent but limited to the period of time that the miner is suction dredging.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) one proposed ponds and 2) one existing temporary access road.

Ponds

Construction and use of the proposed pond would NOT be in compliance with MM-2 because of potential impacts to water quality. No other impacts would occur. See Appendix 3 for detailed discussion.

Access Roads

Under Alternative 2, use of the existing TA road would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* Localized changes would occur in pool frequency and locations related to suction dredging as dredging will create pools and loosen the substrate. The pool created by suction dredging is likely to be permanent because the amount of bedload moving through the stream is limited and the sediment disturbed by suction dredging would be redistributed downstream during high flow events.

No changes would occur to pool frequency related to potential for inputs of fine sediment from mining activity because inputs would move through the system as suspended load and not settle out in the pools. There would be no changes in pool frequency related to *Large Woody Recruitment* because no trees are proposed for removal.

*Water Temperature:* No changes in *Water Temperature* would occur because 1) there would be only very limited removal of trees, none of which would be shade trees, and 2) suction dredging would occur under the requirements established in the ODEQ 700 PM permit which would ensure that there would not be increases in stream channel widths or channel depths which would alter water depths and influence stream temperatures (Appendix 4A).

*Large Woody Debris:* No changes would occur in *Large Woody Debris* recruitment or existing wood in the stream because 1) no trees are proposed for removal and 2) suction dredging would occur under the requirements established in the ODEQ 700 PM permit. Schedule C.6, 7, and 8 of the permit limits the amount of instream habitat structures that can be moved or altered (Appendix 4A).

*Substrate:* Local changes in channel bed substrate are expected as a result of suction dredging. Dredging would pull sediment from the channel bed, pass it up through a suction hose, and run it across a recovery system (sluice box) floating at the surface. The gravel and other material, which washes through the recovery system, would then be washed back into the stream. Pools would be created where the sediment was pulled from and small dredge tailings piles created where the gravel and other material was deposited. In some cases the gravel and other material would be put back into the pool and in other cases deposited in the channel but not in the pool. These dredge tailings would be mobilized during the spring high flow and redistributed downstream. The changes in substrate at the dredge pool location would be permanent but highly localized.

No changes would occur to substrate sediment as a result of potential for inputs of fine sediment related to mining activity because inputs would move through the system as suspended load.

*Bank Stability:* No changes would occur in *Bank Stability* because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes would occur in *Lower Bank Angle* for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability* and thus channel width and 2) suction dredging would occur under the requirements established in the ODEQ 700 PM permit (Appendix 4A). Currently channel bed composition is a mix of cobbles, sands and gravels and highly stable. Therefore, there would be no potential for suction dredging to trigger a headcut and alter channel depths.

**Wetlands and Floodplains**

No activity is proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# ALTERNATIVE 3
# Water Resources
## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

Different than Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** because the placement of two straw bale berms would effectively trap any sediment generated by the activity. Also, the staged removal of the berms eliminate the potential for sediment trapped by the berms from reaching the stream.

Ponds

The test hole would also be the source water pond and the settling pond. The hole would be located on the ford approach to Granite Creek.

*Construction:* Different than Alternative 2. Under Alternative 3, the discharge potential during digging of the test hole **would be eliminated** as a result of the addition of a Forest Service WRPM (Appendix 1A). This WRPM requires that straw bales be placed between the creek and the hole to trap any sediment that moves downslope prior to it reaching the creek.

*Use as Source Water Pond:* Same as Alternative 2. No potential for a discharge when used as a source water pond because the miner would only be withdrawing water.

*Use as Settling Pond:* Different than Alternative 2. Under Alternative 3, the discharge potential via surface or subsurface flow as a result of using as a settling pond **would be eliminated** as a result of the addition of a Forest Service WRPM (Appendix 1A). This WRPM would require the use of straw bales to ensure that any sediment that might be generated as a result of ground water seeping through the road sediments that make up the mining hole would be trapped before reaching Granite Creek.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No potential for a discharge.

**Clean Water Act, Section 303(d)** (antidegradation)

Same as Alternative 2. Granite Creek is listed for sedimentation and the activities proposed in this Plan would not alter the existing water quality condition for which this stream is listed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) one proposed pond and 2) one existing temporary access road.

Pond

Different than Alternative 2. Under Alternative 3, construction and use of the proposed test hole/pond would be in compliance with MM-2 as a result of the addition of a Forest Service WRPM (Appendix 1A). This WRPM would eliminate potential impacts to water quality by requiring the straw bales be placed between the creek and the hole to trap any sediment that moved downslope prior to its reaching the creek. See Appendix 3 for detailed discussion.

Access Road

Same as Alternative 2. Use of the existing TA road would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. Only *Pool Frequency* and *Substrate Sediment* have the potential to be affected as a result of suction dredging. The changes would be permanent but localized to the area dredged and there would be no measurable changes to these inchannel characteristics even within the Plan analysis area.

**Wetlands and Floodplains**

Same as Alternative 2. No activity is proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# Lucky Strike

**Plan type**: Placer and Lode
**Subwatershed:** Clear Creek (HUC 170702020204)
**Subwatershed size:** 20,467 acres
**Analysis area:** 2 acres
**Creek**: N/A. Lightning Creek drainage but more than 300 feet from creek.
**Stream Order:** N/A. On a ridge
**303(d) listed:** N/A
**Suction Dredging:** No
**Essential Salmon Habitat:** No

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Placer portion:*

No potential for a discharge because the site is on a ridge and more than 300 feet from any streams. Ground cover is 100% and composed of needles, grasses, forbs and downed wood.

*Lode portion:*

No potential for a discharge because the site is on a ridge and more than 300 feet from any streams. Ground cover is 100% and composed of needles, grasses, forbs and downed wood.

Ponds

No ponds proposed.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

None. Miner would only use open Forest Service roads that are also used by the general public or private roads.

**Clean Water Act, Section 303(d)** (antidegradation)

Does not apply. No streams in the area proposed for activity.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

There are no structures inside the RHCA as the site is located on a ridge. Therefore, the question of compliance with MM-2 does not apply.

**PACFISH: Riparian Management Objectives (RMOs)**

The RMOs do not apply because the site is distant from any streams.

**Wetlands and Floodplains**

No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# ALTERNATIVE 3
# Water Resources
## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

Same as Alternative 2. No potential for a discharge.

Ponds

No ponds proposed.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Use and/or Creation of Temporary Access Roads

Same as Alternative 2. Only open roads would be used.

**Clean Water Act, Section 303(d)** (antidegradation)

Same as Alternative 2. Does not apply. No streams in the area proposed for activity.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Same as Alternative 2. There are no structures inside the RHCA as the site is located on a ridge. Therefore, the question of compliance with MM-2 does not apply.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. The RMOs do not apply because the site is distant from any streams.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# Make It

**Plan type**: Placer
**Subwatershed:** Upper Granite (HUC 170702020201)
**Subwatershed size:** 9,312 acres
**Analysis area:** 2 acres
**Creek**: Granite Creek (perennial flow and fish bearing)
**Stream Order:** 3rd
**303(d) listed:** Yes for sedimentation
**Suction Dredging:** No
**Essential Salmon Habitat:** Yes

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

No potential for a discharge because the two hillslope sites proposed for mining are more than 80 feet from Granite Creek, and separated from the creek by 80 feet of flat ground and a road that is along the base of the hillslope. The other two sites are located on flat ground on the other side of this road.

Ponds

*Source water pond*

No potential for a discharge via surface or subsurface flow because the miner would only be withdrawing water from an existing pond.

*Settling ponds*

No potential for a discharge via surface flow from the settling ponds into Granite Creek because the ponds are dry depressions in old dredge tailings. They have been dug into flat ground, bermed, and are separated from the creek by about 80 feet of flat ground.

No potential for a discharge via subsurface flow from the ponds to the creek because the ponds are at least 80 feet from the creek, at a similar elevation as the stream, and the flattening of the placer tailings across the valley bottom has likely decreased the permeability of the old tailings.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Use and/or Creation of Temporary Access Roads

Miner proposes to use one existing temporary access (TA) road (Appendix 6).

No potential for a discharge related to use of this road because the road is separated from creek by 80 feet of flat ground and a forested strip that has developed on the road's fill slope. The intervening ground and forested strip are effective sediment traps and would capture any sediment that left the road prior to it reaching the creek.

**Clean Water Act, Section 303(d)** (antidegradation)

Granite Creek is 303(d) listed for sedimentation by ODEQ. Sedimentation is defined by ODEQ as: "The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry…."

The activities proposed in this Plan would not alter the existing water quality condition for which this stream is listed because no new sediment would be added to the stream from the proposed activities.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) an existing source water pond, 2) existing depressions to be used as settling ponds, and 3) one existing temporary access road.

Ponds

*Source water pond*

Use of the source water pond would be in compliance with MM-2 because the miner would only be withdrawing water. Therefore, no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*Settling ponds*

Use of the depressions as settling ponds would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Access Roads

Use of the existing TA road would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* No changes in *Pool Frequency* would occur as a result of the proposed activities because 1) there are no potential inputs of fine sediment, 2) no changes to large woody recruitment are expected (see below), and 3) no suction dredging is proposed.

*Water Temperature:* No changes in *Water Temperature* would occur because 1) there would be no activity in the channel or on the stream banks which would alter channel width and therefore change flow depths for a given discharge, and 2) no shade trees would be removed.

*Large Woody Debris:* No changes would occur in *Large Woody Debris* recruitment or existing wood in the stream because 1) the only place where trees would be cut is on the closed road used to access the site and the areas on the hillslope to be mined and 2) there would be no activity in the channel to alter existing amounts and distributions. This road and mining area are 80 feet from the creek and the road has trees on its fill slope which will not be cut.

*Substrate Sediment:* No changes in *Substrate Sediment* because 1) no suction dredging is proposed, 2) no other inchannel activity is proposed, and 3) no potential for a discharge of sediment from mining activities on land.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* would occur for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability* and channel width and 2) no instream activity which could trigger a headcut and alter channel depth.

## Wetlands and Floodplains

No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

## Other Potential Water Resource Impacts

Stream flow and stream temperature alteration related to water withdrawals

The miner proposes to use a pond that has a direct connection to Granite Creek via a side channel, as source water for processing material. Based on the equipment, the pump would withdraw up to 100 gpm or 0.2 cfs. This is the amount that is assumed would be withdrawn from Granite Creek and what is analyzed below for effects.

*Background*

The potential effects of withdrawing water from Granite Creek on stream flow and stream temperatures were assessed using 1) stream temperature data, 2) water depths, and 3) examination of several stream gages from the larger area to determine the timing of summer low flows. No stream flow data exist for Granite Creek.

a. Stream Temperatures

There are five stream temperature monitors (hobos) on Granite Creek. The closest stream temperature data for this operation are Granite.93C.3 and 93C.4 and their values are shown in **Table 7-7**. The operation is located between the two hobos. The ODEQ stream temperature standard for Granite Creek is 53.6*F. The 7-day running average of the maximum daily stream temperatures for the years with data exceed ODEQ standard at both sites most years.

**Table 7-7**
**7-day running average of the maximum daily stream temperature on Granite Creek in the vicinity of Make It.**

| 2010 NHD HUC 12 name | 2010 NHD HUC 12 | Creek | Hobo number | Survey Yr | District Av. 7 day | Elevation (ft) |
|---|---|---|---|---|---|---|
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.3 | 1996 | 61.7 | 4670 |
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.3 | 1997 | 62.2 | 4670 |
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.3 | 1998 | 65.5 | 4670 |

| 2010 NHD HUC 12 name | 2010 NHD HUC 12 | Creek | Hobo number | Survey Yr | District Av. 7 day | Elevation (ft) |
|---|---|---|---|---|---|---|
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.3 | 2002 | 63.8 | 4670 |
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.3 | 2003 | 63.97 | 4670 |
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.3 | 2005 | 61.26 | 4670 |
| | | | | | | |
| Upper Granite Creek | 170702020201 | Granite | Granite.93C.4 | 1997 | 57.85 | 5006 |

b. Water Depths

The only water depth data available for Granite Creek in the area of Make-It are at the hobo locations. Only the years with depth data are provided (**Table 7-8**). Water depths varied some each year between installation and removal indicating some reduction in flow.

**Table 7-8**
**Water depths at hobo sites with at installation and removal of stream temperature hobos in the vicinity of Make It.**

| Hobo number | Survey Yr | Elevation (ft) | water depth at installation (inches) | water depth at removal (inches) | Installation Date | Removal Date |
|---|---|---|---|---|---|---|
| Granite.93C.3 | 1998 | 4670 | 1.4 | 1.2 | July 6 | Oct 1 |
| Granite.93C.3 | 1999 | 4670 | 1.4 | 0.9 | June 28 | Sept 21 |
| Granite.93C.3 | 2002 | 4670 | 1.2 | 0.9 | July 2 | Oct 8 |
| Granite.93C.3 | 2003 | 4670 | 1.1 | 1.0 | June 24 | Oct 21 |
| Granite.93C.3 | 2005 | 4670 | 1.0 | 0.7 | July 1 | Oct 13 |

c. Stream Flow

There are no stream gages on Granite Creek. Therefore, stream hydrographs from six stream gages around the area were examined for the period of June 10 through Sept 30 for 2007 and 2013 to determine when stream flows were reflecting groundwater inputs only (base flows) and would therefore be at their lowest (*project file)*. These years were selected because 2007 was a low flow year on some streams in the area and 2013 was selected because there was some point-in-time stream flow measurements made on other streams in the analysis area. Drainage areas for these stream gages ranged from 7 sq. miles up to 121 sq. miles.

While there was some variability between years and stations, stream low flows tend to occur between early to mid-July through early to late September. Therefore, any water withdrawals during this time would be occurring when the flows would be at their lowest.

Predictions regarding climate change for the Blue Mountains are for increased periods of drought, reductions in snowpacks, and a shift in the timing of peak flows to earlier in the year (Luce et al 2013; Science Briefing 2014). Under these conditions, stream flows are expected to decrease during the summer months, the initiation of summer low flows may occur sooner (i.e. from early-mid July to sometime in June), and stream temperatures may increase. An additional impact is that some streams may change from perennial to intermittent flow.

*Conclusions*

No impact to stream temperatures or flow related to withdrawing water from the pond that is connected to Granite Creek via a side channel despite the stream temperatures exceeding ODEQ standard of 53.6*F because the pond holds abundant water and the amount diverted from Granite Creek into the pond is small. There is a return flow channel from the pond into Granite Creek. Amount of water flowing down Granite Creek is much greater than 0.2 cfs even during dry years. No change in downstream temperature is expected and the stream is not expected to go dry downstream. Therefore, under Alternative 2, the Plan would be in compliance with the John Day Basin TMDL.

# ALTERNATIVE 3
# Water Resources

## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

Same as Alternative 2. No potential for a discharge.

Ponds

Same as Alternative 2. No potential for a discharge.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No potential for a discharge.

**Clean Water Act, Section 303(d)** (antidegradation)

Same as Alternative 2. Granite Creek is listed for sedimentation and the activities proposed in this Plan would not alter the existing water quality condition for which this stream is listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) existing source water pond, 2) existing depressions to be used as settling ponds, and 3) one existing temporary access road.

Ponds

*Source water pond*

Same as Alternative 2. Use of the pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Settling ponds*

Same as Alternative 2. Use of the ponds would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Access Roads

Same as Alternative 2. Use of the existing TA road would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. No changes in the RMOs.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

Stream flow and stream temperature alteration related to water withdrawals

Same as Alternative 2. The impact of withdrawing water from Granite Creek would not be measureable on stream flow or stream temperatures given the scale of the stream flow compared to the amount proposed to be withdrawn. Therefore, the Plan would still be in compliance with the John Day Basin TMDL.

# Muffin

**Plan type**: Placer
**Subwatershed:** Upper Granite (HUC 170702020201)
**Subwatershed size:** 9,312 acres
**Analysis area:** 2.5 acres
**Creek**: Last Chance Creek (perennial flow BUT non fish-bearing). Creek is now a series of ponds.
**Stream Order:** N/A. This drainage is largely a series of ponds, wetlands and lush meadows due to past mining activity which built berms across the creek and possibly dredged the valley bottom. In places there are small channels that carry flow.
**303(d) listed:** No
**Suction Dredging:** No
**Essential Salmon Habitat:** No

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Sites 1, 2, and 3*

No potential for a discharge because area to be mined is a hillslope and any sediment that left the site would be immediately trapped in the meadow area of Last Chance Creek which has lush grasses. The closest channel in the gulch is 20 feet away from the base of the hillslope. No mining is proposed in Last Chance Creek meadow area.

*Site 4*

No potential for a discharge because site is more than 300 feet from Last Chance Creek and has abundant ground cover in the intervening area and a road.

Ponds

*Source water pond*

No potential for a discharge via surface or subsurface flow because the miner would only be withdrawing water from an existing pond.

*Settling ponds*

There are two settling ponds. Settling pond #1, the primary settling pond, is up out of the gulch on flat ground and separated from the gulch by the source water pond, and settling pond #2. The area where material is stored prior to processing is in this area of flat ground near settling pond #1.

Settling pond #2 is the over flow pond. It is located below settling pond #1 on the edge of the meadow. Water in the pond was at least 2 feet below their top. Abundant vegetation occurs on the pond rims and in Last Chance Creek.

No potential for a discharge via surface or subsurface flow into Last Chance Creek from use of the existing setting ponds because the ponds are well sealed, dug into the ground, surrounded by a low berm, and their combined size is more than large enough to hold the processing water.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Miner proposes to use on Forest Service closed road and one existing Temporary Access road (Appendix 6). Both roads are native surface roads.

*Forest Service closed road 7355-012*

No potential for a discharge from using Forest Service closed road 7355-012 because the ends in the camp site and does not reach the creek.

*TA road 7355-M1a*

No potential for a discharge as a result of using this road because 1) it is more than 60 feet from the edge of the creek on this side, 2) the intervening ground is well forested and has 80 to 100% ground cover, 3) the creek is located within a meadow composed of very lush grasses and forbs and 4) the creek is 20 feet from the meadow/hillslope edge. The forested ground, the meadow vegetation and the distance from the creek indicate that any sediment that leave the road would be trapped prior to reaching the creek.

**Clean Water Act, Section 303(d)** (antidegradation)

Last Chance Creek is not listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) one existing source water pond, 2) two existing settling ponds, 2) one Forest Service closed road and 3) one existing temporary access road.

Ponds

*Source water pond*

Use of the existing source water pond would be in compliance with MM-2 because the miner would only be withdrawing water. Therefore, no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*Settling ponds*

Use of the existing settling ponds would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Access Roads

*Forest Service closed road 7355-012*

Use of the FS closed road would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*TA road 7355-M1a*

Use of the existing TA road would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* No changes in *Pool Frequency* would occur because 1) there would be no inputs of sediment into the creek, 2) no trees are proposed for removal in areas that would influence inputs of woody material, and 3) no suction dredging is proposed.

*Water Temperature:* No changes in *Water Temperature* would occur because 1) there would be no activity in the channel or on the stream banks which would alter channel width and therefore change flow depths for a given discharge, and 2) no shade trees are proposed for removal.

*Large Woody Debris:* No changes in *LWD* would occur because the stream flows through a meadow.

*Substrate Sediment:* No changes in *Substrate Sediment* because 1) no suction dredging is proposed, 2) no other inchannel activity is proposed, and 3) no potential for a discharge of sediment from mining activities on land.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* would occur for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability,* and therefore no change to channel widths and 2) no instream activity which could trigger a headcut and alter channel depths.

**Wetlands and Floodplains**

No activity is proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

Flow reversal from wetland into test holes

There is the potential for some reversal of groundwater flow from the wetland into the test holes proposed along the edge of the wetland at sites 1, 2, and 3. The impact on the wetland is expected to be local because the test hole at each site will be small (20x 25x 6-10 feet deep) and filled in prior to excavating the next hole.

## ALTERNATIVE 3
## Water Resources
**Direct and Indirect Effects****Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Sites, 1, 2, 3, and 4*

Same as Alternative 2. No potential for a discharge

Ponds

Same as Alternative 2. No potential for a discharge

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No potential for a discharge

**Clean Water Act, Section 303(d)** (antidegradation)

Last Chance Creek is not listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) one existing source water pond, 2) two existing settling ponds, 2) one Forest Service closed road and 3) one existing temporary access road.

Ponds

*Source water pond*

Same as Alternative 2. Use of the source water pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Settling ponds*

Same as Alternative 2. Use of the settling ponds would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Access Roads

*Forest Service closed road 7355-012*

Same as Alternative 2. Road use would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*TA road 7355-M1a*

Same as Alternative 2. Road use would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. No changes in the RMOs.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

Flow reversal from wetland into test holes

SIMILAR to Alternative 2. The potential for some reversal of groundwater flow from the wetland into the test holes proposed along the edge of the wetland at sites 1, 2, and 3 remains but is less as a result of the addition of Forest Service WRPM (Appendix 1A). These WRPMs decreases the size of the hole at each site at any one time to either 10 feet or less or would start the hole 5 to 10 feet back from where the hillslope has a break in slope just before it reaches the wetland meadow area. As a result the flow reversal would be less.

# Old Eric 1 & 2

**Plan type**: Placer
**Subwatershed:** Upper Granite (HUC 170702020201)
**Subwatershed size:** 9,312 acres
**Analysis area:** 1 acre
**Creek**: Granite Creek (perennial flow and fish bearing)
**Stream Order:** 4th
**303(d) listed:** Yes for sedimentation
**Suction Dredging:** Yes
**Essential Salmon Habitat:** Yes

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

No potential for discharge via surface or subsurface flow of sediment because the mining activity is at least 100 feet from Granite Creek and the intervening ground is flat and lush with grasses and forbs. There is a ditch that is 50 feet from the mining area but the intervening ground also has lush grasses and forbs. The flat topography and abundant ground cover would effectively trap any sediment that moved off site before it reached either the ditch or the creek.

Ponds

*Source water pond*

No potential for a discharge via surface or subsurface flow because the miner would only be withdrawing water from an existing pond.

*Settling ponds*

No potential for a discharge via surface flow of any pollutant into Granite Creek from using the pond because the pond is well sealed, dug into the ground and surrounded by a low berm.

No potential for a discharge via subsurface flow of sediment because the pond bottom and sides are well vegetated with lush grasses and rushes which are effective at trapping sediment.

However, there would be a potential for a discharge via subsurface flow of **elevated water temperatures** because the pond is 80 feet long and parallels the creek, is within 15 feet of Granite Creek and elevationally above the creek, and largely unshaded. Therefore, if the

amount of water in the pond was such that it remained in the pond for multiple days, there is the potential for it to heat up. As the pond is elevationally above the creek and within 15 feet of the creek, the result could be the influx of warmer water entering Granite Creek.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Bridges

*Existing bridge*

No potential for a discharge of sediment as a result of use because it is stable and no modifications are planned.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

The miner proposes to use one existing temporary access road to access his campsite (Appendix 6). No potential for a discharge of sediment into Granite Creek as a result of using the road because the road is composed of old tailings, on flat ground, and does not cross the creek.

**Clean Water Act, Section 303(d)** (antidegradation)

Granite Creek is 303(d) listed for sedimentation by ODEQ. Sedimentation is defined by ODEQ as: “The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry….”

The activities proposed in this Plan would maintain the water quality condition for which this stream is listed for the following reasons. First, there would be no potential for increased sedimentation from the proposed activities (including suction dredging) because there would be no inputs of fine sediment due to mining-related activities on land. Second, no new sediment would be added into the stream as a result of suction dredging. Instead, the substrate would simply be loosened and redistributed downstream during the spring high flows. The changes in substrate would be permanent but highly localized and restricted to the areas that are suction dredged.

**Suction Dredging**

Suction dredging is permitted under the ODEQ 700PM permit (Appendix 4A). This permit has a series of requirements for dredging in any stream with additional requirements for dredging in

essential salmon habitat. Granite Creek is essential salmon habitat and therefore all aspects of the 700PM permit apply. While Granite Creek is 303d listed for sediment, suction dredging is grandfathered in on Granite Creek under Schedule C.19.

In evaluating suction dredging on Granite Creek in the area of the proposed operation, impacts to the following parameters were considered: pool frequency and distribution, habitat complexity (e.g. log jams, instream wood, beaver dams), stream temperatures, turbidity, and substrate, and channel bed stability (Appendix 4B, 4C). The miner has clearly stated that they will be following the requirements of the 700PM permit (Appendix 4A).

Site Characteristics

The channel bed in this area is predominantly cobbles with some gravels and sands and highly stable given the abundance of cobbles. Granite Creek was historically placer mined and therefore, the percentage of the silts and clays in the channel bed is expected to be limited. The only source of abundant fine-grained material would be the stream banks. However, no mining or destabilizing of the stream banks is permitted under the 700PM permit (Schedule C.5, 6, 7 and 8).

Water Quality and Channel Morphology analysis

*Pool frequency and distribution:* Localized changes would occur in pool frequency and locations related to suction dredging as dredging will create pools and loosen the substrate. The pool created by suction dredging is likely to be permanent because the amount of bedload moving through the stream is limited and the sediment disturbed by suction dredging would be redistributed downstream during high flow events.

*Habitat complexity*: Local change on habitat complexity because boulders and habitat structures may be moved around in the stream but not removed. Therefore, the impacts of suction dredging on in-channel habitat complexity may occur but should be limited to small areas. The changes would be permanent.

Schedule C.6 prohibits removing or disturbing boulders, rooted vegetation, or embedded woody plants and other habitat structures from the stream banks. Habitat connected to the stream banks (beaver dams, undercuts, root wads etc.) therefore would remain intact thereby ensuring that some key habitat types would not be modified.

*Stream temperatures*: No changes to stream temperatures would occur because suction dredging would not alter stream channel widths, channel depths, remove stream side shade or alter groundwater flows.

*Turbidity*: Local changes to water clarity would occur as represented by changes in turbidity. Turbidity could extend beyond the immediate area that is dredged but changes in water clarity are not allowed under the 700 PM permit to extend beyond 300 feet downstream.

However, given the past history of placer mining in this stream, fines are expected to be limited in the channel bed and therefore the turbidity plume is expected to dissipate much sooner than 300 feet downstream. In addition, the turbidity plume would only occur when dredging is occurring. Therefore, the temporal impact is limited to the when the miner is suction dredging.

*Substrate:* Local changes in channel bed substrate are expected as a result of suction dredging. Dredging would pull sediment from the channel bed, pass it up through a suction hose, and run it across a recovery system (sluice box) floating at the surface. The gravel and other material, which washes through the recovery system, would then be washed back into the stream. Pools would be created where the sediment was pulled from and small dredge tailings piles created where the gravel and other material was deposited. In some cases the gravel and other material would be put back into the pool and in other cases deposited in the channel but not in the pool. These dredge tailings would be mobilized during the spring high flow and redistributed downstream. The changes in substrate at the dredge pool location would be permanent but highly localized.

*Channel bed stability*: No changes to channel bed stability would occur even though dredging will create pools, because the channel bed is composed of cobbles, sand and gravel and is highly stable. Therefore, no headcutting and bed destabilization is expected to occur.

Summary of Effects

The analysis found that suction dredging would have no impact on 1) stream temperature or 2) channel bed stability for the reasons stated above. Suction dredging would have a local impact on 1) pool frequency and distribution, 2) habitat complexity, 3) turbidity and 4) substrate for the reasons stated above. The changes to pool frequency, habitat complexity and substrate are expected to be permanent but limited to the area worked and therefore would not have a measurable impact on channel complexity or channel stability. Changes in turbidity would impact less than 300 feet of stream and not be permanent but limited to the period of time that the miner is suction dredging.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) one existing source water pond, 2) one existing settling pond, 3) one existing temporary access road, and 4) one existing bridge.

Ponds

*Source water pond*

Use of the existing source water pond would be in compliance with MM-2 because the miner would only be withdrawing water. Therefore, no impacts would occur to water quality, inchannel

complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*Settling ponds*

Use of the settling pond would NOT be in compliance with MM-2 because of the potential impact to stream temperature as a result of warm pond water entering Granite Creek via subsurface flow. See Appendix 3 for detailed discussion.

Access Roads

Use of the existing TA road would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Bridges

Use of the existing wooden bridge across the creek would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* Localized changes would occur in pool frequency and locations related to suction dredging, as dredging will create pools and loosen the substrate. The pool created by suction dredging is likely to be permanent because the amount of bedload moving through the stream is limited and the sediment disturbed by suction dredging would be redistributed downstream during high flow events.

No changes would occur to pool frequency related to *Large Woody Recruitment* because no trees are proposed for removal.

*Water Temperature:* Potential localized effects to water temperature would occur as a result of the influx of warmer water from the settling pond via subsurface flow. The settling pond is 80 feet long, parallels the creek, is within 15 feet of Granite Creek, elevationally above the creek, and largely unshaded.

*Large Woody Debris:* No changes would occur in *Large Woody Debris* recruitment or existing wood in the stream because 1) no trees are proposed for removal and 2) suction dredging would occur under the requirements established in the ODEQ 700 PM permit. Schedule C.6, 7, and 8 of the permit limits the amount of instream habitat structures that can be moved or altered (Appendix 4A).

*Substrate:* Local changes in channel bed substrate are expected as a result of suction dredging. Dredging would pull sediment from the channel bed, pass it up through a suction hose, and run it across a recovery system (sluice box) floating at the surface. The gravel and other material, which washes through the recovery system, would then be washed back into the stream. Pools would be created where the sediment was pulled from and small dredge tailings piles created where the gravel and other material was deposited. In some cases the gravel and other material would be put back into the pool and in other cases deposited in the channel but not in the pool. These dredge tailings would be mobilized during the spring high flow and redistributed downstream. The changes in substrate at the dredge pool location would be permanent but highly localized.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* would occur for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability* and therefore no changes in channel width and 2) suction dredging would occur under the requirements established in the ODEQ 700 PM permit (Appendix 4A). Currently channel bed composition is a mix of cobbles, sands and gravels and is highly stable. Therefore, there are no concerns related to the potential for suction dredging to trigger a headcut and increase channel depths.

**Wetlands and Floodplains**

No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# ALTERNATIVE 3
# Water Resources
## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

<u>Mining Activity</u>

Same as Alternative 2. No discharge potential.

Ponds

*Source water pond*

Same as Alternative 2. No potential for a discharge.

*Settling ponds*

Same as Alternative 2 with respect to sediment. No potential for a discharge with respect to sediment.

Different than Alternative 2 with respect to temperature. Under Alternative 3, the discharge potential for discharge via subsurface flow, related to temperature, **would be eliminated** as a result of the addition of a Forest Service WRPM (Appendix 1A) that limits the amount of water that enters the settling pond to the amount that will infiltrate in a day. This prevents the development and subsequent input of a continuous flow of warmer water into the creek.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Bridges

*Existing bridge*

Same as Alternative 2. No potential for a discharge of sediment.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No discharge potential.

**Clean Water Act, Section 303(d)** (antidegradation)

Same as Alternative 2. Granite Creek is listed for sedimentation and the activities proposed in this Plan would maintain the existing water quality condition for which this stream is listed.

**Suction Dredging**

Same as Alternative 2. The analysis found that suction dredging would have no impact on stream temperature or channel bed stability for the same reasons stated under Alternative 2. Suction dredging would have localized and permanent impacts related to pool frequency and

distribution, habitat complexity and substrate and localized but short-term impacts to turbidity for the same reasons stated under Alternative 2.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) one existing source water pond, 2) one existing settling pond, 3) one existing temporary access road, and 4) one existing bridge.

Ponds

*Source water pond*

Same as Alternative 2. Use would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Settling ponds*

Different than Alternative 2. Under Alternative 3, use of the settling pond would be in compliance with MM-2 as a result of the addition of a Forest Service WRPM (Appendix 1A) that limits the amount of time there can be standing water in the pond. See Appendix 3 for detailed discussion.

Access Roads

Same as Alternative 2. Use of the existing TA road would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Bridges

Same as Alternative 2. Use of the existing wooden bridge across the creek would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Different than Alternative 2. Under Alternative 3, the potential effect to water temperatures would no longer occur as a result of a Forest Service WRPM (Appendix 1A). This WRPM limits the length of time there can be standing water in the pond.

However, *Pool Frequency* and *Substrate Sediment* still have the potential to be affected by suction dredging. The changes would be permanent but localized to the area dredged and there would be no measurable changes to these inchannel characteristics even within the Plan analysis area.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# Olive Tone

**Plan type**: Placer
**Subwatershed**: Beaver Creek (HUC 170702020203)
**Subwatershed size:** 13,075 acres
**Analysis area:** 2 acres
**Creek**: Olive Creek (perennial flow and fish-bearing)
**Stream Order:** 1st
**303(d) listed:** No
**Suction Dredging:** No
**Essential Salmon Habitat**: Yes

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

No potential for a discharge as a result of mining activity because the area to be mine is the base of the hillslope which is 60 to 80 feet from the creek. The intervening ground is flat and vegetation is minimal. The flat ground is composed of old placer tailings and infiltration rates are likely high. Therefore any sediment generated by the activity would be trapped on the flat ground prior to reaching the creek.

Ponds

*Source water pond*

*Pond construction:* No potential for a discharge from source water pond construction because the pond would be dug into the ground and separated from the creek by 50 feet of flat ground.

*Pond Use:* No potential for a discharge from use of the source water pond because the water would be withdrawn from Olive Creek, and therefore clean water.

*Settling ponds*

*Pond construction:* No potential for a discharge from settling pond construction because the ponds would be dug into the ground and are separated from the creek by 50 feet of flat ground.

*Pond Use:* No potential for a discharge via surface flow from the proposed ponds because the ponds would be dug into the ground and are separated from the creek by 50 feet of flat ground.

Potential for a discharge of sediment via subsurface flow into Olive Creek because the proposed ponds 1) would be in old placer tailings, 2) would be elevationally above the creek with subsurface flow towards the creek, and 3) the old tailings may have a high permeability and large pores that could allow both water and sediment to move through the subsurface. In addition, water moving towards Olive Creek via subsurface flow could mobilize the bank sediments when the water reemerged at the stream bank face.

Ford

One existing ford proposed for use via temporary acess road1305-E4b. No potential for a discharge because the existing ford approaches are already rocked and sloped and stable.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

The miner proposes to use two existing Temporary Access roads (Appendix 6). Both are native surface roads.

*TA Road 1305-E4a (existing)*

No potential for a discharge from using this existing road because the road is elevationally above the creek and about 30 feet from it. The ground between the creek and the road is forested on the fillslope side of the road. The ground cover would trap any sediment prior to it reaching the creek should any sediment generated by use of the road leave the road.

*TA Road 1305-E4b (existing)*

No potential for a discharge from using this existing road because the road is about 20 feet from the creek and on flat ground. While the ground cover is limited, the topography and distance would be effective at trapping any sediment from the road before it reached the creek.

**Clean Water Act, Section 303(d)** (antidegradation)

Olive Creek is not 303d listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) two proposed settling ponds and 2) two existing temporary access roads.

Ponds

*Source water pond*

Construction and use of the source water pond would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. Construction would occur in old tailings and water would be withdrawn from Olive Creek. See Appendix 3 for detailed discussion.

*Settling ponds (proposed)*

Construction of the settling ponds would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. Construction would occur in old tailings. See Appendix 3 for detailed discussion.

Use of the ponds would NOT be in compliance with MM-2 because of the potential input of sediment into the creek via groundwater flow through the tailings, resulting in a reduction in water quality. See Appendix 3 for detailed discussion.

Access Roads

Use of the existing TA roads would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* No changes in *Pool Frequency* would occur as a result of the proposed activities for the following reasons: 1) The potential inputs of fine sediment under would be small and move through the systems as suspended load, 2) no changes to large woody recruitment are expected (see below), and 3) no suction dredging is proposed.

*Water Temperature:* No changes in *Water Temperature* would occur because there would be 1) no activity in the channel or on the stream banks which would alter channel width and therefore change flow depths for a given discharge, and 2) no removal of stream-side shade trees (Appendix 8).

*Large Woody Debris:* No changes would occur in *Large Woody Debris* recruitment or existing wood in the stream because 1) only a few trees would be removed (Appendix 8) and 2) there would be no activity in the channel to alter existing amounts and distributions.

*Substrate Sediment:* No changes in *Substrate Sediment* because 1) no suction dredging is proposed, 2) no other inchannel activity is proposed, and 3) the potential inputs of fine sediment

via subsurface flow from the settling pond would be small and would move through the system as suspended load and not alter the substrate.

*Bank Stability:* No changes in *Bank Stability* because 1) no activity would occur on the stream banks and 2) there would be no removal of the stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* would occur for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability* and therefore no increase in channel width and 2) no instream activity which could trigger a headcut and increase channel depths.

**Wetlands and Floodplains**

No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

Stream flow and stream temperature alteration related to water withdrawals

The Olive Tone miner proposes to withdraw water from a spring and from Olive Creek to use as source water for processing material. Based on the pump size (10 HP 3" pump), the pump would withdraw approximately 100 gallons per minute or 0.2 cfs. This is the amount that is assumed would be withdrawn from Olive Creek if all the water came from Olive Creek, and is what is analyzed below for effects.

*Background*

The potential effects of withdrawing water from Olive Creek on stream flow and stream temperatures were assessed using 1) stream temperature data, 2) water depths taken when installing and retrieving stream temperature monitors (hobos), 3) a stream flow measurement from July 19, 2013, and 4) examination of several stream gages from the larger area to determine the timing of summer low flows which are the result of only groundwater inputs.

a. Stream Temperatures

There are two stream temperature monitors (hobos) on Olive Creek. Hobo Olive.93L.1 is downstream of the confluence of McWillis Gulch and Olive Creek and hobo Olive.93L.2 is upstream of the confluence of Quartz Gulch and Olive Creek. McWillis Gulch does not

contribute flow during the summer to Olive Creek but Quartz Gulch, upstream of McWillis Gulch, does contribute flow to Olive Creek.

Hobo Olive.93L.2 is located downstream of the Olive Tone operation and upstream of the Belvadear operation. The ODEQ stream temperature standard for Olive Creek is 53.6*F. The 7-day running average of the maximum daily stream temperatures for the years with data exceed ODEQ standard at both sites most years (**Table 7-9**).

**Table 7-9**
**7-day running average of the maximum daily stream temperature of Olive Creek in the vicinity of Olive Tone**

| 2010 NHD HUC 12 name | 2010 NHD HUC 12 | Creek | Hobo number | Survey Year | District Av. 7 day | Elevation (ft) |
|---|---|---|---|---|---|---|
| Beaver Creek | 170702020203 | Olive | Olive.93L.1 | 1995 | 56.42 | 5181 |
| Beaver Creek | 170702020203 | Olive | Olive.93L.1 | 1996 | 57.1 | 5181 |
| Beaver Creek | 170702020203 | Olive | Olive.93L.1 | 2006 | 55.77 | 5181 |
| Beaver Creek | 170702020203 | Olive | Olive.93L.1 | 2008 | 56.3 | 5181 |
| | | | | | | |
| Beaver Creek | 170702020203 | Olive | Olive.93L.2 | 1996 | 55.9 | 5266 |
| Beaver Creek | 170702020203 | Olive | Olive.93L.2 | 2006 | 53.09 | 5266 |
| Beaver Creek | 170702020203 | Olive | Olive.93L.2 | 2008 | 55.7 | 5266 |

b. Water Depths

Hobo Olive.93L.2 is located between the Belvadear and Olive Tone operations. Water at the time of installation and removal at the site were 12.4 inches or less and in most cases 6 inches or less (**Table 7-10**). The stream reach located upstream of this hobo, but downstream of the Olive Tone operation, has been observed to go dry (C. Helberg, UNF Minerals Administrator, pers. com. 2014).

Maximum water depths were measured at hobo Olive.93L.1, located downstream of McWillis Gulch, on October 13, 2006. The water depth was measured every 10 feet for 100 feet, starting at the hobo site and heading upstream. Values ranged from 3.5 to 4 inches deep.

**Table 7-10**
**Water depths at hobo site Olive.93L.2 at installation and removal. Hobo is located downstream of Olive Tone**

| Year | Water depth at installation (inches) | Water depth at removal (inches) | Installation Date | Removal Date |
|---|---|---|---|---|
| 1999 | 6 | 3 | June 2 | Sept 7 |

| Year | Water depth at installation (inches) | Water depth at removal (inches) | Installation Date | Removal Date |
|---|---|---|---|---|
| 2000 | 5 | 2 | May 15 | Sept 14 |
| 2006 | 12 | 4 | July 11 | Oct 13 |
| 2008 | 12.4 | 11.4 | Jul 4 | Oct 16 |

c. Stream Flow

There are no stream gages on Olive Creek. Therefore, stream hydrographs from six stream gages around the area were examined for the period of June 10 through Sept 30 for 2007 and 2013 to look for patterns of flow (*project file)*. Drainage areas for these stream gages ranged from 7 sq. miles up to 121 sq. miles.

Year 2007 was selected because flows were very low on the NFBR, which is the closest stream gage to Olive Creek and therefore expected to reflect the similar climate conditions, and 2013 because this was the year that the point-in-time stream flow measurement was made on Olive Creek. The stream hydrographs were examined to determine when stream flows were reflecting groundwater inputs only (base flows) and would therefore be at their lowest. While there was some variability between years and stations, stream low flows tend to occur between early to mid-July through early to late September. Therefore, any water withdrawals during this time would be occurring when the flows would be at their lowest.

Predictions regarding climate change for the Blue Mountains are for increased periods of drought, reductions in snowpacks, and a shift in the timing of peak flows to earlier in the year (Luce et al 2013; Science Briefing 2014). Under these conditions, stream flows are expected to decrease during the summer months, the initiation of summer low flows may occur sooner (i.e. from early-mid July to sometime in June), and stream temperatures may increase. An additional impact is that some streams may change from perennial to intermittent flow.

A point-in-time (instantaneous) stream flow measurement was made on July 19, 2013 by Umatilla Forest personnel about 1.5 miles downstream of the proposed activity area. The stream flow was 1.414 cfs with water depths ranging from 2 to 9.5 inches. This flow measurement included water from Quartz Gulch and Buck Gulch and therefore would be larger than the flow at the Olive Tone site which is located upstream of Quartz Gulch and the Belvadear operation. However, using the discharge of 1.414 cfs, the amount proposed for removal by the miner (0.2 cfs) would be 14 percent of the flow. In a drought year or with extended drought, summer low flows are expected to be less making the amount withdrawn (0.2 cfs) a greater percentage of the total flow.

*Conclusions*

The available data show that currently stream depths and flows are low in the summer and stream temperatures exceed the ODEQ standard. Therefore, the miner's proposal to withdraw up to 0.2 cfs during the summer has the potential to 1) increase stream temperatures

downstream, 2) decrease water depths downstream, and/or 3) dry up the stream below the operation. Therefore, under Alternative 2, the Plan would not be in compliance with the John Day Basin TMDL.

# ALTERNATIVE 3
## Water Resources
### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

Same as Alternative 2. No potential for a discharge.

Ponds

*Source water pond*

Same as Alternative 2. No potential for a discharge.

*Settling ponds*

*Surface flow:* Same as Alternative 2. No potential for a discharge.

*Subsurface flow:* Different than Alternative 2. Under Alternative 3, the discharge potential via subsurface flow **would be eliminated** with the addition of a Forest Service WRPM (Appendix 1A) which would create a buried barrier between the pond and the creek. The barrier would decrease the permeability of the settling ponds and prevent the sediment from leaving the pond and moving through the subsurface to the creek.

Ford

Same as Alternative 2. No potential for a discharge.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No potential for a discharge.

**Clean Water Act, Section 303(d)** (antidegradation)

Olive Creek is not listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) two proposed settling ponds and 2) two existing temporary access roads.

Ponds

*Source water pond*

*Construction and use*: Same as Alternative 2. Construction and use of the source water pond would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*Settling ponds (proposed)*

*Construction:* Same as Alternative 2. Construction of the ponds would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Use:* Different than Alternative 2. Under Alternative 3, use of the ponds would be in compliance with MM-2 as a result of the addition of a Forest Service WRPM (Appendix 1A and 1C). This WRPM would create a buried barrier between the pond and the creek. The barrier would decrease the permeability of the settling ponds and prevent the sediment from leaving the pond and moving through the subsurface to the creek. See Appendix 3 for detailed discussion.

Access Roads

Same as Alternative 2. Use of the two existing TA roads would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. No changes in the RMO parameters.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

Stream flow and stream temperature alteration related to water withdrawals

Same as Alternative 2. The available data show that currently stream depths and flows are low in the summer and stream temperatures exceed the ODEQ standard. Therefore, the miner's proposal to withdraw up to 0.2 cfs during the summer has the potential to 1) increase stream temperatures downstream, 2) decrease water depths downstream, and/or 3) dry up the stream below the operation. Therefore, under Alternative 3, the Plan would still not be in compliance with the John Day Basin TMDL.

# Rosebud

**Plan type**: Placer
**Subwatershed:** Lower Granite (HUC 170702020206)
**Subwatershed size:** 20,282 acres
**Analysis area:** 5 acres
**Creek**: Granite Creek (perennial flow and fish-bearing)
**Stream Order:** 5th
**303(d) listed:** Yes for sedimentation
**Suction Dredging:** No
**Essential Salmon Habitat:** Yes

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

No potential for a discharge of sediment into Granite Creek because the mining areas are more than 300 feet from the creek and are separated from the creek by1 ) processing ponds, 2) the powerline road (1000-E1a), 3) old dredge ponds now surrounded by abundant riparian vegetation, and 4) County Road 24. The depressions are in fine-grained material with a low permeability. The distance and features between the depressions and the creek and the composition of the depression sediments are effective sediment trapping mechanisms.

Ponds

*Source water pond*

No potential for a discharge via surface or subsurface flow because the miner would only be withdrawing water from an existing pond.

*Settling ponds*

No potential for discharge of sediment via surface or subsurface flow into Granite Creek because the settling ponds are actually dry depressions located against the hillslope. They are more than 300 feet from Granite Creek and separated from the creek by 1) the powerline road (1000-E1a), 2) old dredge ponds now surrounded by abundant riparian vegetation, and 3) County Road 24. The depressions are in fine-grained material with a low permeability. The distance and features between the depressions and the creek and the composition of the depression sediments are effective sediment trapping mechanisms.

However, there is the potential for water to overtop some of the shallow depressions and flow down the road and move road and settling pond sediments into the old dredge ponds.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

The miner proposes to use one existing temporary access road (TA 1000-E1a). Road 1000-E1a is also referred to as the powerline road (Appendix 6). The road is a native surface road.

No potential for a discharge of sediment into Granite Creek from use of this road because the road is more than 300 feet from Granite Creek and is separated from the creek by County Road 24 and old dredge ponds. Any sediment, generated as a result of use related to mining activity and transported off the road, would be trapped by the riparian vegetation that has become established around the old dredge ponds.

**Clean Water Act, Section 303(d)** (antidegradation)

Granite Creek is 303(d) listed for sedimentation by ODEQ. Sedimentation is defined by ODEQ as: “The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry….”

The activities proposed in this Plan would not alter the existing water quality condition for which this stream is listed because no new sediment would be added to the stream from the proposed activities.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) two ponds (a source water pond and a settling pond) and 2) one existing TA road.

Ponds

*Source water pond*

Use would be in compliance with MM-2 because only water would be withdrawn. Therefore, no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*Settling ponds*

Use of the dry depressions would be in compliance with MM-2 because there would be no impacts to water quality in Granite Creek or inchannel complexity, channel morphology, soils or riparian vegetation.

Access Roads

Use of the existing TA road would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

The RMOs do not apply because the site is more than 300 feet from Granite Creek.

**Wetlands and Floodplains**

No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# ALTERNATIVE 3
# Water Resources
## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

Same as Alternative 2. No potential for a discharge.

Ponds

*Source water pond*

Same as Alternative 2. No potential for a discharge.

*Settling ponds*

Same as Alternative 2. No potential for a discharge into Granite Creek. Also, the addition of a Forest Service WRPM (Appendix 1A) which would ensure that the depressions were sufficiently bermed to prevent spillover onto the road and transport of sediment from the ponds or from the road into the old dredge ponds.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No potential for a discharge.

**Clean Water Act, Section 303(d)** (antidegradation)

Same as Alternative 2. Granite Creek is listed for sedimentation and the activities proposed in this Plan would maintain the existing water quality condition for which this stream is listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) two ponds (a source water pond and a settling pond) and 2) one existing TA road.

Ponds

*Source water pond*

Same as Alternative 2. Use would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Settling ponds*

Same as Alternative 2. Use would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Access Roads

Same as Alternative 2. Use of the existing TA road would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. The RMOs do not apply because the site is more than 300 feet from Granite Creek.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# Royal White

**Plan type**: Lode
**Subwatershed:** Beaver Creek (HUC 170702020203)
**Subwatershed size:** 13,075 acre
**Analysis area:** 3 acres
**Creek**: N/A. In the Irish Gulch drainage but on a ridge and more than 300 feet from any stream channel.
**Stream Order:** N/A. On a ridge.
**303(d) listed:** N/A
**Suction Dredging:** No
**Essential Salmon Habitat:** No

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

No potential for a discharge as a result of lode mining because the adits are on a ridge and there are no streams or stream channels or wetlands in the area.

Ponds

No potential for a discharge because Royal White ponds are located on a ridge and more than 300 feet from any drainage.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Miner proposes to use three existing Temporary Access roads (Appendix 6). All are native surface roads.

No potential for a discharge as a result of use of these roads for mining because the roads are on a ridge, and there are no streams or stream channels or wetlands in the area.

**Clean Water Act, Section 303(d)** (antidegradation)

N/A. The operation is on a ridge and there are no streams in the area.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

N/A. There are no structures located inside any RHCA because the ponds, roads and site are located on a ridge.

**PACFISH: Riparian Management Objectives (RMOs)**

The RMOs do not apply because the site is on a ridge and more than 300 feet from any creek.

**Wetlands and Floodplains**

No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# ALTERNATIVE 3
## Water Resources
### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

Same as Alternative 2. No potential for a discharge.

Ponds

Same as Alternative 2. No potential for a discharge.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No potential for a discharge.

**Clean Water Act, Section 303(d)** (antidegradation)

N/A. The operation is on a ridge and there are no streams in the area.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

N/A. There are no structures located inside any RHCA because the ponds, roads and site are located on a ridge.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. The RMOs do not apply because the site is on a ridge and more than 300 feet from any creek.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# Ruby

**Plan type**: Placer
**Subwatershed:** Clear Creek (HUC 17070202024)
**Subwatershed size:** 20,467 acres
**Analysis size:** 2.5 acres
**Creek**: Clear Creek (perennial flow and fish-bearing); Ruby Creek (intermittent flow and fish-bearing)
**Stream Order:** Clear = 4th; Ruby = 3rd
**303(d) listed:** No for Clear Creek, No for Ruby Creek
**Suction Dredging:** No
**Essential Salmon Habitat:** Clear Creek = Yes. Ruby Creek = No

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Sites 1, 2, and 3*

Potential for a discharge because the description of the miner-proposed buffer zone is not specific enough to determine its effectiveness in preventing a discharge of sediment into Ruby Creek. Depending on the starting point the miner intended to use when measuring "10 feet from the creek", there "may" or "may not" be a potential for a discharge. If the buffer is measured from the low flow channel, they would be mining right on the edge of the valley floor next to the channel. As a result of this uncertainty, the worst-case scenario was used is assessing potential water quality impacts (**Appendix 1B, Figure 3, Point A**). In point A scenario, there would be the potential for a discharge of sediment into Clear Creek.

*Site 4 (has two areas evaluated)*

1. *Valley Floor area:* Potential for a discharge because the description of the miner-proposed buffer zone is not specific enough to determine its effectiveness in preventing a discharge of sediment into Clear Creek. Depending on the starting point the miner intended to use when measuring "10 feet from the creek", there may or may not be a potential for a discharge because 1) the Clear Creek stream bank is actively eroding, 2) the side channel is connected to Clear Creek at high flow, and 3) measuring the 10 feet buffer from the low flow channel of Clear Creek would put mining activity on an active gravel bar. In addition, the area to be mined is an old road that ends at the stream bank.

As a result of this uncertainty, the worst-case scenario was used is assessing potential water quality impacts (**Appendix 1B, Figure 3, Point A**). In point A scenario, there would be the potential for a discharge of sediment into Clear Creek.

2. *Mining in the spur road*: There is a spur road off of 1310-E1a that is part of Site 4 and is proposed for mining. The spur road 1) ends at the stream bank, 2) is on a slight incline, and 3) there is very limited ground cover. Therefore, potential for a discharge of sediment into Clear Creek because site conditions are such that sediment from the road would reach the creek, because there are no sediment traps to prevent this from occurring.

*Site 5*

Potential for a discharge because the description of the miner-proposed buffer zone is not specific enough to determine its effectiveness in preventing a discharge of sediment into Clear Creek. Depending on the starting point the miner intended to use when measuring 10 feet from the creek, there "may" or "may not" be a potential for a discharge. If the 10 feet were measured from the Clear Creek low flow channel, then the activity would occur on an active cobble bar. As a result of this uncertainty, the worst-case scenario was used when assessing potential water quality impacts (**Appendix 1B, Figure 3, Point A**). In point A scenario, there would be the potential for a discharge of sediment into Clear Creek.

*Site 6*

Same site characteristics as Site 5. As a result there would be the potential for a discharge of sediment into Clear Creek.

*Site 7*

No potential for a discharge into Clear Creek because the site is 1) more than 100 feet from Clear Creek, 2) is behind a low ridge, and 3) would not disturb the wetland area created by the old dredge pond.

*Site 8*

Same site characteristics as Site 4. Potential for a discharge depends on the starting point the miner intended to use when measuring "10 feet from the creek". There may or may not be a potential for a discharge because 1) the Clear Creek stream bank is actively eroding, 2) there is a side channel that is connected to Clear Creek at high flow, and 3) measuring the 10 feet buffer from the low flow channel of Clear Creek would put mining activity on an active gravel bar.

As a result of this uncertainty, the worst-case scenario was used is assessing potential water quality impacts (**Appendix 1B, Figure 3, Point A**). In point A scenario, there would be the potential for a discharge of sediment into Clear Creek.

Ponds

No ponds proposed. Miner will be using a self-contained unit.

Fords

Two existing fords proposed for use via temporary mine access road 1310-E1a .

*Clear Creek ford*

Potential for a discharge of sediment from use of the existing Clear Creek ford because the southwest approach is composed of fines, is steeply sloped, and the northeast approach is composed of fines.

*Ruby Creek ford*

Potential for a discharge of sediment from use of the existing Ruby Creek ford when the access road and ford was used when wet because 1) Ruby Creek flows down the road at high flow and 2) the road and ford approaches are all composed of fine sediment. Ford used to access mining sites 1, 2, and 3.

Proposed Temporary ATV bridge

Potential for a discharge of sediment into Clear Creek from the placement and removal of the ATV bridge at the Clear Creek ford location because the southwest approach is composed of fines, is steeply sloped, and the northeast approach is composed of fines.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

The miner proposes to use six existing temporary access (TA) roads to access the various sites (Appendix 6). All are native surface roads.

*TA Road 1310-E1a (used to access sites 1, 2, and 3)*

Potential for a discharge into Ruby Creek as a result of using this road because 1) it is a native surface road composed of fine sediment and 2) the road becomes part of the creek during the spring high flows. Use of the road by vehicles would break up any armoring that has developed on the road bed and generate fines (Burroughs and King, 1989; Luce and Black 1999; Luce and Black 2001; Swift 1984). The sediment would then be transported down the road and into Ruby Creek at the ford when the creek overtopped it banks and flows down the road.

*TA Road 1310-E1b (used to access site 2)*

No potential for a discharge because 1) the distance between the road and Ruby Creek is at least 25 feet, 2) the ground is flat, and 3) the ground between the road and the creek is lush grasses. Therefore, any sediment that leaves the road would be trapped before it could reach Ruby Creek.

*TA Road 1310-E3a (used to access sites 4 and 5)*

No potential for a discharge because this road is separated from Clear Creek by 85 to 100 feet of vegetated ground. The topography is flat. Therefore, any sediment that exits the road would be trapped prior to reaching Clear Creek.

*TA Road 1310-E3b (used to access site 6)*

No potential for a discharge because 1) the road used to access site 6 is 150 feet from Clear Creek and 2) the intervening ground is well-vegetated and flat. Therefore, any sediment that leaves the road would be trapped prior to its reaching Clear Creek.

*TA Road 1310-E3c (used to access site 7)*

No potential for a discharge of sediment into Clear Creek because the area is completely disconnected from Clear Creek by the low ridge and sediment would be trapped behind the ridge.

*TA Road 1310-E4a (used to access site 8)*

No potential for a discharge of sediment into Clear Creek, generated from use of the road to access Site 8, because the road is more than 200 feet from the creek, the ground cover between the creek and the road is lush grasses and forbs, and the road is on flat ground.

**Clean Water Act, Section 303(d)** (antidegradation)

Clear Creek and Ruby Creek are not listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) six existing temporary access (TA) roads and 2) a temporary ATV bridge. There are no ponds as the miner would be using a self-contained processing unit.

Ponds

None. Using a self-contained unit.

Access Roads

*TA roads except TA 1310-E1a*

Use of these existing TA roads would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*TA road 1310-E1a (used to access sites 1, 2, and 3)*

Use of this TA road would NOT be in compliance with MM-2 because of potential impacts to water quality because Ruby Creek flows down this road during high flows. See Appendix 3 for detailed discussion.

Proposed Temporary ATV bridge

Installation of this bridge at the ford location would NOT be in compliance with MM-2 because there is the potential for impacts to water quality and inchannel complexity. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* No changes in *Pool Frequency* would occur as a result of the proposed activities for the following reasons: 1) The potential inputs of fine sediment under Alternative 2 would be small and move through the system as suspended load, 2) no changes to large woody recruitment are expected (see below), and 3) no suction dredging is proposed.

*Water Temperature:* No changes in *Water Temperature* would occur because 1) there would be no activity in the channel or on the stream banks which would alter channel width, and therefore change flow depths for a given discharge, and 2) no removal of trees is proposed.

*Large Woody Debris:* No changes would occur in *Large Woody Debris* recruitment or existing wood in the stream because 1) no removal of trees is proposed and 2) there would be no activity in the channel to alter existing amounts.

*Substrate Sediment:* No changes in *Substrate Sediment* because 1) no suction dredging is proposed, 2) no other inchannel activity is proposed, and 3) the potential inputs of fine sediment would be small and would move through the system as suspended load and not alter the substrate.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of the stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* would occur for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability,* and therefore no increase in channel width and 2) no instream activity which could trigger a headcut and therefore increase channel depths.

**Wetlands and Floodplains**

No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# ALTERNATIVE 3
# Water Resources
## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Site 1, 2, and 3*

Different than Alternative 2. Under Alternative 3, discharge potential **would be eliminated** because the Forest Service WRPM (Appendix 1A) clarifies the buffer location. This WRPM, which clarifies the Plan-specific buffer, ensures that the activity takes place on the valley floor terrace. The ground is flat in this area and lush with grasses and fords. The flat ground and vegetation are effective sediment traps and would prevent any sediment that might leave the mining area from reaching the creek.

*Site 4 (has two areas evaluated)*

1. *Valley floor area:* Different than Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** because the Forest Service WRPM (Appendix 1A) clarifies the buffer location. This WRPM, which clarifies the Plan-specific buffer, ensures that the activity takes

place on the valley floor terrace. The ground is flat in this area and has large tailings piles in places that separate the area to be tested from the creek, or 2) there is a slight rise at the edge of the side channel bank, which in combination with the straw bales or waddles, would prevent sediment from entering either the side channel or Clear Creek.

2. *Mining in the spur road*: Different than Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** because the Forest Service WRPM (Appendix 1A) would require placement of straw bales 10 feet from the edge of the Valley Floor-Channel Break in Slope (Appendix 1B, Figures 1 and 2). The straw bales would effectively trap any sediment that might move down the road and would prevent it from reaching Clear Creek.

*Site 5*

Different than Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** because the Forest Service WRPMs (Appendix 1A) clarify the buffer location. This WRPM, which clarifies the Plan-specific buffer, ensures that the activity takes place on the valley floor terrace. The ground is flat, there is riparian vegetation on the stream bank slopes, and straw bales or waddles would be placed between the mining activity and the creek. The combination of these are an effective sediment trap. In addition, the requirement to fill in each hole before digging another hole in the area eliminates a key sediment source that could enter Clear Creek.

*Site 6*

Different than Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** for the reasons noted for Site 5.

*Site 7*

Same as Alternative 2. No discharge potential

*Site 8*

Different than Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** for the reasons noted for Site 5.

<u>Ponds</u>

No ponds. Using a self-contained unit.

<u>Fords</u>

Two existing fords proposed for use via temporary mine access road 1310-E1a.

*Clear Creek ford*

Different than Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** because a Forest Service WRPM (Appendix 1A) requires that the ford approaches be rocked and sloped. This Forest Service WRPM would remove the source of the fines that could enter into Clear Creek as a result of using the ford.

*Ruby Creek ford*

Different than Alternative 2. Under Alternative 3, discharge potential **would be eliminated** as a result of the addition of Forest Service WRPM (Appendix 1A). These protection measures would remove the source of the fines that could enter into Ruby Creek and the potential for Ruby Creek to flow down the road during high flows.

Proposed Temporary ATV bridge

Different than Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** from placement and removal of the ATV bridge because the Forest Service WRPM (Appendix 1A) for the Clear Creek ford would protect the banks from eroding and contributing sediment into Clear Creek.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Miner proposes to use six existing Temporary Access roads to access the various sites (Appendix 6). All are native surface roads.

*TA Road 1310-E1a (used to access sites 1, 2, and 3)*

Different than Alternative 2. Under Alternative 3, discharge potential **would be eliminated** because the Forest Service site-specific WRPMs (Appendix 1A) would 1) prevent the stream from flowing onto the road and transporting sediment generated by use into the creek at the ford, 2) require that sections of the road be rocked, and 3) require that the ford approaches be rocked. These protection measures would eliminate the sources of sediment that could enter into Ruby Creek as a result of road use related to mining activity.

*TA Road 1310-E1b (used to access site 2)*

Same as Alternative 2. No potential for a discharge.

*TA Road 1310-E3a (used to access sites 4 and 5)*

Same as Alternative 2. No potential for discharge.

*TA Road 1310-E3b (used to access site 6)*

Same as Alternative 2. No potential for a discharge.

*TA Road 1310-E3c (used to access site 7)*

Same as Alternative 2. No potential for a discharge.

*TA Road 1310-E4a (used to access site 8)*

Same as Alternative 2. No potential for a discharge.

**Clean Water Act, Section 303(d)** (antidegradation)

Clear Creek and Ruby Creek are not listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) six existing temporary access roads and 2) a temporary ATV bridge. There are no ponds as the miner would be using a self-contained processing unit.

Ponds

N/A. No ponds. Using a self-contained unit.

Access Roads

*Existing TA roads except TA 1310-E1a*

Same as Alternative 2. Use of these existing TA roads would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Existing TA road 1310-E1a (used to access sites 1, 2, and 3)*

Different than Alternative 2. Under Alternative 3, use of this road would be in compliance with MM-2 as a result of the addition of Forest Service WRPMs (Appendix 1A). These WRPMs 1) create a straw bale berm that prevents the creek from flowing down the road at high flows, 2)

require that select sections of the road be rocked and 3) that the ford approaches be rocked. See Appendix 3 for detailed discussion.

Proposed temporary ATV bridge

Different than Alternative 2. Under Alternative 3, installation of this bridge would be in compliance with MM-2 as a result of the addition of Forest Service WRPMs (Appendix 1A). These WRPMs require 1) that the bridge be seasonally removed to prevent wood buildup behind it and 2) that the ford approaches to Clear Creek be rocked. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. No changes in the RMO parameters.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# Sunshine McWillis

**Plan type**: Placer
**Subwatershed:** Beaver Creek (HUC 170702020203)
**Subwatershed size:** 13,075 acres
**Analysis area:** 2.5 acres
**Creek**: McWillis Gulch (intermittent flow and non fish-bearing)
**Stream Order:** 2nd
**303(d) listed:** No
**Suction Dredging:** Yes
**Essential Salmon Habitat:** No

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Site 1*

No potential for a discharge because the mining site is into the hillslope and there is a berm at the base of the work area that prevents any sediment from reaching the gulch.

*Site 2*

Potential for discharge because mining site #2 is on a forested hillslope that borders McWillis Gulch. Removal of vegetation and movement of materials to the processing sites would likely result in some sediment entering the gulch.

Ponds

*Processing site 1*

***Source water pond***

*Pond 1:* No potential for a discharge via surface or subsurface flow because the miner would only be withdrawing water from an existing pond.

***Settling ponds***

*Pond 2:* Potential for a discharge because Pond 2 has a pipe that connects the pond to Pond 3 and a low spot that could serve as an outlet of muddy water into the gulch if the pond overtopped.

*Pond 3:* No potential for a discharge because the pond is not in the drainage and is sufficiently bermed to prevent any overflow.

*Processing site 2*

One proposed pond. Potential for a discharge because the proposed pond at this site would be in the drainage of the gulch which seasonally carries water. Therefore any sediment that is put into the pond would be mobilized during the spring flows and transported downstream into Olive Creek.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Bridges

One existing wooden bridge across McWillis Gulch Creek is proposed for use. Bridge would be used for regular vehicle traffic and heavy equipment. No potential for a discharge of sediment as a result of use because bridge is existing and stable and no bridge modifications planned.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

The miner proposes to use one Forest Service closed road, one Forest Service decommissioned road and one existing Temporary Access roads to access the various sites (Appendices 3 and 7). All are native surface roads.

*FS closed road 1305-054*

No potential for a discharge related to use of this road because the closed Forest Service road is more than 100 feet from the gulch, and the intervening ground is well vegetated with grasses, forbs, needles, and downed wood. The ground cover and distances are effective sediment trapping mechanisms and would capture any sediment that leaves the roads prior to it reaching the gulch.

*FS decommissioned road 1305-130*

No potential for a discharge because related to use of this road because the decommissioned road leaves the closed road and is used to access the cabin area. Distance between the road and the gulch varies but is more than 50 feet from the gulch at its closest. The intervening ground cover is 100 % and composed of grasses, forbs, needles, and downed wood. The ground cover and distances are effective sediment trapping mechanisms and would capture any sediment that leaves the roads prior to it reaching the gulch.

*TA Road 1305-M1a*

No potential for a discharge related to use of this road because the existing access road is on flat ground, parallels the gulch, and crosses the gulch at a bridge. The intervening ground cover is a mix of riparian shrubs, grass, forbs, and needles. The ground cover and distances are effective sediment trapping mechanisms and would capture any sediment that leaves the roads prior to it reaching the gulch.

**Clean Water Act, Section 303(d)** (antidegradation)

McWillis Gulch is not listed.

**Suction Dredging**

Suction dredging is permitted under the ODEQ 700PM permit (Appendix 4A). This permit has a series of requirements for dredging in any stream with additional requirements for dredging in essential salmon habitat. McWillis Gulch is NOT essential salmon habitat and therefore Schedule C. 16, 17, 18, and 19 of the 700PM permit apply do not apply.

In evaluating suction dredging on McWillis Gulch in the area of the proposed operation impacts to the following parameters were considered: pool frequency and distribution, habitat complexity (e.g. log jams, instream wood, beaver dams), stream temperatures, turbidity, and substrate, and channel bed stability (Appendix 4B, 4C). The analysis assumes that the miner would be in compliance with the 700PM permit (Appendix 4A) and all its requirements.

Site Characteristics

The channel bed in this area is predominantly cobbles with some gravels and sands and highly stable given the abundance of cobbles. McWillis Gulch was historically placer mined and therefore, the percentage of the silts and clays in the channel bed is expected to be limited. The only source of abundant fine-grained material would be the stream banks. However, no mining or destabilizing of the stream banks is permitted under the 700PM permit (Schedule C.5, 6, 7 and 8).

Water Quality and Channel Morphology analysis

*Pool frequency and distribution*: Localized changes would occur in pool locations and frequency related to suction dredging as dredging will create pools and loosen the substrate. The pool created by suction dredging is likely to be permanent because the amount of bedload moving through the stream is limited and the sediment disturbed by suction dredging would be redistributed downstream during high flow events.

*Habitat complexity*: Local change to habitat complexity would occur because boulders and habitat structures may be moved around in the stream but not removed. Therefore, the impacts of suction dredging on in-channel habitat complexity may occur but should be limited to small areas. The changes would be permanent

Schedule C.6 prohibits removing or disturbing boulders, rooted vegetation, or embedded woody plants and other habitat structures from the stream banks. Habitat connected to the stream banks (beaver dams, undercuts, root wads etc.) therefore would remain intact thereby ensuring that some key habitat types would not be modified.

*Stream temperatures*: No changes to stream temperatures would occur because suction dredging would not alter stream channel widths, channel depths, remove stream side shade or alter groundwater flows.

*Turbidity*: Local change would occur to water clarity as represented by changes in turbidity. Turbidity could extend beyond the immediate area that is dredged but changes in water clarity are not allowed under the 700 PM permit to extend beyond 300 feet downstream. However, given the past history of placer mining in this stream, fines are expected to be limited in the channel bed and therefore the turbidity plume is expected to dissipate much sooner than 300 feet downstream. In addition, the turbidity plume would only occur when dredging is occurring. Therefore, the temporal impact is limited to the when the miner is suction dredging.

*Substrate:* Local changes in channel bed substrate are expected as a result of suction dredging. Dredging would pull sediment from the channel bed, pass it up through a suction hose, and run it across a recovery system (sluice box) floating at the surface. The gravel and other material, which washes through the recovery system, would then be washed back into the stream. Pools would be created where the sediment was pulled from and small dredge tailings piles created where the gravel and other material was deposited. In some cases the gravel and other material would be put back into the pool and in other cases deposited in the channel but not in the pool. These dredge tailings would be mobilized during the spring high flow and redistributed downstream. The changes in substrate at the dredge pool location would be permanent but highly localized.

*Channel bed stability*: No changes to channel bed stability would occur even through dredging will create pools because the channel bed is composed of cobbles, sand and gravel. Therefore, no headcutting and bed destabilization is expected to occur.

Summary of Effects

The analysis found that suction dredging would have no impact on 1) stream temperature or 2) channel bed stability for the reasons stated above. Suction dredging would have a local impact on 1) pool frequency and distribution, 2) habitat complexity, 3) turbidity and 4) substrate for the reasons stated above. The changes to pool frequency, habitat complexity and substrate are expected to be permanent but limited to the area worked and therefore would not have a measurable impact on channel complexity or channel stability. Changes in turbidity would impact less than 300 feet of stream and not be permanent but limited to the period of time that the miner is suction dredging.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) existing ponds at Processing site 1, 2) proposed pond at Processing site 2, 3) one FS decommissioned road, 4) one existing temporary access road, and 5) existing bridge. The miner also proposes to use a FS closed road but this road is outside the RHCA. Therefore, it is not discussed in this section.

Ponds (Processing site 1)

*Source water pond*

Pond 1 is the source water pond. It would be in compliance with MM-2 because the miner would only be withdrawing water. Therefore, no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*Settling ponds*

Pond 2 would NOT be in compliance with MM-2 because of potential impact to water quality. See Appendix 3 for detailed discussion.

Pond 3 would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Ponds (Processing site 2)

Construction and use of the proposed pond would NOT be in compliance with MM-2 because of potential impacts to water quality. See Appendix 3 for detailed discussion.

Access Roads

*FS decommissioned road 1305-130*

Use of this road would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*TA road 1305-M1a*

Use of this road would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Bridges

Use of the existing wooden bridge across McWillis Gulch Creek would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* Localized changes would occur in pool locations and frequency related to suction dredging as dredging will create pools and loosen the substrate. The pool created by suction dredging is likely to be permanent because the amount of bedload moving through the stream is limited and the sediment disturbed by suction dredging would be redistributed downstream during high flow events.

No changes would occur to pool frequency related to potential for inputs of fine sediment from mining activity because inputs would move through the system as suspended load and not settle out in the pools. There would be no changes in pool frequency related to *Large Woody Recruitment* because no trees are proposed for removal.

*Water Temperature:* No changes in *Water Temperature* would occur because 1) there would be no activity in the channel or on the stream banks which would alter channel width and therefore change flow depths for a given discharge, and 2) there would be only very limited removal of trees, none of which would be shade trees.

*Large Woody Debris:* No changes would occur in *Large Woody Debris* recruitment or existing wood in the stream because 1) the only place where trees would be cut is in a small area proposed for mining. This area is adjacent to McWillis Gulch, which has intermittent flow and abundant in-channel riparian woody vegetation. 2) There would be no activity in the channel to alter existing amounts and distributions.

*Substrate:* Local changes in channel bed substrate are expected as a result of suction dredging. Dredging would pull sediment from the channel bed, pass it up through a suction hose, and run it across a recovery system (sluice box) floating at the surface. The gravel and other material, which washes through the recovery system, would then be washed back into the stream. Pools would be created where the sediment was pulled from and small dredge tailings piles created where the gravel and other material was deposited. In some cases the gravel and other material would be put back into the pool and in other cases deposited in the channel but not in the pool. These dredge tailings would be mobilized during the spring high flow and redistributed downstream. The changes in substrate at the dredge pool location would be permanent but highly localized.

No changes would occur to substrate sediment as a result of potential for inputs of fine sediment related to mining activity because inputs would move through the system as suspended load.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of the stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* would occur for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability* and therefore no increase in channel width and 2) no instream activity which could trigger a headcut and increase channel depths.

**Wetlands and Floodplains**

No activity is proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# ALTERNATIVE 3
# Water Resources
## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Site 1*

Same as Alternative 2. No potential for a discharge.

*Site 2*

Different than Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** as a result of the additional Forest Service WRPM (Appendix 1A) that adds straw bales 10 feet from the edge of the hillslope to ensure that there is an effective sediment trap in place that prevents sediment from reaching McWillis Gulch.

Ponds

*Processing site 1*

***Source water pond***

*Pond 1:* Same as Alternative 2. No potential for a discharge via surface or subsurface flow because only withdrawing water from an existing pond.

***Settling ponds***

*Pond 2:* Different then Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** as a result of the Forest Service WRPM (Appendix 1A) that berms the low spots on Pond 2. This ensures that sediment entering into the pond would not enter the gulch.

*Pond 3:* Same as Alternative 2. No potential for a discharge.

*Processing site 2*

Different than Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** as a result of the Forest Service WRPM (Appendix 1A) that restricts processing activity to Processing site 1.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Bridges

Same as Alternative 2. Use of the existing wooden bridge would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

The miner proposes to use one Forest Service closed road, one Forest Service decommissioned road and one existing Temporary Access roads to access the various sites (Appendices 3 and 7). All are native surface roads.

*FS closed road 1305-054*

Same as Alternative 2. No potential for a discharge.

*FS decommissioned road 1305-130*

Same as Alternative 2. No potential for a discharge.

*TA Road 1305-M1a*

Same as Alternative 2. No potential for a discharge.

**Clean Water Act, Section 303(d)** (antidegradation)

McWillis Gulch is not listed.

**Suction Dredging**

Same as Alternative 2. The analysis found that suction dredging would have no impact on stream temperature or channel bed stability for the same reasons stated under Alternative 2. Suction dredging would have localized and permanent impacts related to pool frequency and distribution, habitat complexity and substrate and localized but short-term impacts to turbidity for the same reasons stated under Alternative 2.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) existing ponds at processing site 1, 2) proposed pond at processing site 2, 3) one FS decommissioned road, 4) one existing temporary access road, and 5) one existing bridge. The miner also proposes to use a FS closed road but this road is outside the RHCA. Therefore, it is not discussed in this section.

Ponds (Processing site 1)

*Source water pond*

Pond 1: Same as Alternative 2. Use of the pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Settling ponds*

Pond 2: Different than Alternative 2. Under Alternative 3, use of this pond would be in compliance with MM-2 as a result of the addition of a Forest Service WRPM that requires a berm in the low spot in the pond. This eliminates the potential for a discharge. See Appendix 3 for detailed discussion.

Pond 3: Same as Alternative 2. Use of the pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Ponds (Processing site 2)

Different than Alternative 2. Under Alternative 3, this site is dropped as the result of the addition of a Forest Service WRPM that restricts processing activity to Site #1. See Appendix 3 for detailed discussion.

Access Roads

*FS decommissioned road 1305-130*

Same as Alternative 2. Use of this road would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*TA road 1305-M1a*

Same as Alternative 2. Use of this road would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Bridges

Same as Alternative 2. Use of the existing wooden bridge across would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. Only *Pool Frequency* and *Substrate Sediment* have the potential to be affected as a result of suction dredging. The changes would be permanent but localized to the

area dredged and there would be no measurable changes to these inchannel characteristics even within the Plan analysis area.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# Tetra Alpha Placer

**Plan type**: Placer
**Subwatershed:** Upper Granite (HUC 170702020201)
**Subwatershed size:** 9,312 acres
**Analysis area:** 8 acres
**Creek**: Boulder Creek (perennial flow and fish bearing)
**Stream Order:** 2nd or 3rd depending on mining site
**303(d) listed:** No
**Suction Dredging:** No
**Essential Salmon Habitat:** Yes

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining activity

*Stage 1 mining site (downstream site)*

Potential for a discharge because the description of the miner-proposed buffer zone is not specific enough to determine effectiveness. The proposal is to mine both sides of the existing mine access road that runs along the base of the south hillslope. Depending on the starting point the miner intended to use to measure the 25 -foot buffer and what they identify as the "Boulder Creek high water mark", there "may" or "may not" be a potential for a discharge as a result of mining on the north side of the road.

If the 25-foot miner-proposed buffer is measured from the top of the channel bank, then portions of the activity would occur at the edge of the wet meadow, BUT if measured from the back edge of the wet meadow, the activity would be behind the tailings that line the edge of the meadow. In the first case, there would be the potential for a discharge of sediment into Boulder Creek. In the second case (behind the tailings) there would not be a potential for a discharge.

As a result of this uncertainty, the worst-case scenario was used is assessing potential water quality impacts (**Appendix 1B, Figure 3, Point A**). In point A scenario, there would be the potential for a discharge of sediment into Clear Creek.

*Stage 2 mining site (upstream site)*

Potential for a discharge because the description of the miner-proposed buffer zone is not specific enough to determine effectiveness. Depending on the starting point the miner intended to use to measure the 25 -foot buffer and what they identify as the "Boulder Creek high water

mark", there "may" or "may not" be a potential for a discharge as a result of mining on the north side of the road.

If the 25-foot miner-proposed buffer is measured from the top of the channel bank, then portions of the activity would occur at the edge of the wet meadow or in the meadow, BUT if measured from the back edge of the wet meadow, the activity would occur up on the hillslope and there would be 25 feet of hillslope vegetation and the lush meadow vegetation that separates the activity area from the creek. In the first case, there would be the potential for a discharge of sediment into Boulder Creek. In the second case (on the hillslope) there would not be a potential for a discharge.

As a result of this uncertainty, the worst-case scenario was used is assessing potential water quality impacts (**Appendix 1B, Figure 3, Point A**). In scenario A, there would be the potential for a discharge of sediment into Clear Creek.

Ponds

*Source water pond*

No potential for a discharge via surface or subsurface flow because only withdrawing water from an existing pond in Last Chance Creek.

*Settling ponds*

No potential for discharge via surface flow into Boulder Creek from the existing settling pond because the pond has a large capacity, is dug into the ground, is in a stable location, is well bermed, and is more than 150 feet from Boulder Creek.

No potential for a discharge via subsurface flow into the creek because the pond is dug into fine sediments and the pond is separated from the creek by a wet meadow that has lush vegetation.

Fords

Three fords proposed for use via closed Forest Service road 7355-011. One is an existing ford and two are proposed fords.

*Lower existing ford (west ford)*

Used to access Stage 1 area. Potential for a discharge of sediment into Boulder Creek as a result of the use of the ford because the ford approaches are composed of fine-grained sediments.

*Middle proposed ford*

Used to access Stage 2 site. Potential for a discharge into Boulder Creek because the north approach is very steep and the approaches on both sides are composed of fines.

*Upper proposed ford (east ford*)

Used to access Stage 2 site as well. Potential for a discharge into Boulder Creek because the stream banks are vertical, 1 to 2 feet high, and fine grained.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads:

The miner proposes to use one Forest Service closed road, one existing Temporary Access road and four proposed Temporary Access roads (Appendix 6). All are native surface roads.

*Forest Service closed road 7355-011*

This road is used to access the placer processing site and serves as the starting point for the roads that access the two mining areas.

No potential for a discharge related to use of this road because the road is within 50 feet of the creek in places, and once it reaches the processing site, the distance to the creek increased to more than 200 feet. The intervening ground is composed of lush grasses and forbs. This ground cover type would effectively trap any sediment that exits the road would prevent it from reaching the creek.

*TA Road 7355-M3a (existing)*

This road would be used to access a portion of the Stage 1 mining area.

No potential for a discharge into Boulder Creek because this existing road is separated from the creek by tailings piles.

*TA Road 7355-M3b (proposed)*

This road would be used to access the upper portion of the Stage 1 mining area.

No potential for a discharge into Boulder Creek as a result of creation and use of this two-track road because the road would be separated from the creek by about 50 feet of vegetated ground that is a mix of downed wood, grasses, needles and forbs. This ground cover would be effective at trapping any sediment that might exit the road prior to reaching the creek.

*TA Roads 7355-M3c and most of M3d (except meadow portion) (proposed)*

Proposed two-track roads 7355-M3c and M3d would be used to access the Stage 2 area. M3d has about 350 feet that crosses a lush meadow. This segment is discussed separately.

No potential for a discharge as a result of creation and use because these roads would occur about 25 feet from the edge of the meadow on the hillslope. The ground cover in the meadow is lush grasses, forbs and sedges and the ground cover on the hillslope is needles, grasses, forbs, and downed wood. The ground cover would prevent any sediment generated by construction and use of these two roads from reaching Boulder Creek.

*TA Road 7355-M3d (meadow segment) (proposed)*

Potential for a discharge as a result of the creation and use of this segment of two-track which would cross the meadow. The meadow has lush grasses, forbs and sedges. The road would cross Boulder Creek and there would be the potential that sediment generated by creation and use of this road could travel into Boulder Creek.

**Clean Water Act, Section 303(d)** (antidegradation)

Boulder Creek is not 303(d) listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) an existing pond (used as source water and settling pond), 2) one FS closed road, 3) one existing temporary access road and 4) four proposed TA roads.

Ponds

*Source water pond*

Use would be in compliance with MM-2 when the existing pond used as a source water pond because the miner would only be withdrawing water. Therefore, no impacts to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*Settling ponds*

Use would also be in compliance with MM-2 when using the existing pond as a settling pond because no impacts water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Access Roads

*Forest Service closed road 7355-011*

Use of this road would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*TA Road 7355-M3a (existing)*

Use of the existing TA road would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*TA Roads 7355-M3b, M3c, and most of M3d (except meadow portion) (proposed)*

Creation and use of the proposed TA roads would NOT be in compliance with MM-2 because 1) there would be new soil disturbance inside the RHCA and 2) there are not sufficient protection measures to ensure that disturbance is minimal and that appropriate reclamation would be done. See Appendix 3 for detailed discussion.

*TA Road 7355-M3d (meadow segment) (proposed)*

Creation and use of this portion of M3d would NOT be in compliance with MM-2. In addition to new soil disturbance, this portion of the road would 1) impact water quality, 2) locally impact to stream banks and thus channel morphology, and 3) locally impact riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* No changes would occur in *Pool Frequency* related to the potential inputs of fine sediment under Alternative 2 because the inputs would be small and move through the system as suspended load and 2) there would be no changes in pool frequency related to *Large Woody Recruitment* because the area on the south side of Boulder Creek, which is proposed for mining, is more than 50 feet from the creek and trees would remain in the intervening ground.

*Water Temperature:* No changes in *Water Temperature* would occur because 1) there would be no activity in the channel or on the stream banks which would alter channel width and

therefore change flow depths for a given discharge, and 2) there would be only very limited removal of trees and none would be shade trees.

*Large Woody Debris:* This RMO does not apply as this is a meadow system.

*Substrate Sediment:* No changes in *Substrate Sediment* because 1) no suction dredging is proposed, 2) no other inchannel activity is proposed, and 3) the potential inputs of fine sediment would be small and would move through the system as suspended load and not alter the substrate.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* would occur for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability* and therefore no increase in channel width and 2) no instream activity which could trigger a headcut and therefore increase channel depths.

**Wetlands and Floodplains**

The miner proposes to create a two-track temporary access road 7355-M3d across a wet meadow area which is combination of wetland and active floodplain to access the Stage 2 mining area. Length of section across the meadow is about 350 feet and would cross Boulder Creek.

The Plan would NOT be in compliance with Executive Order 11988 (Protection of Floodplains) and Executive Order 11990 (Protection of Wetlands) because the miner has not ensured that two-track road would not lead to the development of a channel related to road erosion. A new channel would alter groundwater flows and potentially trigger gully development in the meadow.

**Other Potential Water Resource Impacts**

<u>Stream flow and stream temperature alteration related to water withdrawals</u>

The miner proposes to use water from an existing off-channel pond for processing placer material. The pond is 110 feet from the creek and elevationally above the creek. In addition, the miner proposes to withdraw water from Boulder Creek, if necessary, to supplement the water in the pond water (i.e. make up water). Based on the pump size (10 HP 3" pump), the pump would withdraw approximately 100 gallons per minute or 0.2 cfs. This is the amount that is assumed would be withdrawn from Boulder Creek if the pond needed make up water and is the amount analyzed below.

*Background*

The potential effects of withdrawing water from Boulder Creek on stream flow and stream temperatures were assessed using 1) stream temperature data, 2) water depths taken during the installation and removal of the stream temperature monitors (hobos), and 3) examination of several stream gages from the larger area to determine the timing of summer low flows which are the result of groundwater inputs only.

a. Stream Temperatures

The ODEQ stream temperature standard for Boulder Creek is 53.6*F. There are five stream temperature monitors (hobos) on Boulder Creek. The 7-day running average of the maximum daily stream temperatures for the years with data exceed ODEQ standard at all sites (**Table 7-11**). The pond currently proposed for use as the processing site is located up on a terrace away from the stream and between hobos Boulder.93C.2 and Boulder.93C.3.

**Table 7-11**
**7-day running average of the maximum daily stream temperature on Boulder Creek for years with temperature data in the vicinity of Tetra Alpha**

| 2010 NHD HUC 12 name | 2010 NHD HUC 12 | Creek | Hobo number | Survey Yr | District Av. 7 day | Elevation (ft) |
|---|---|---|---|---|---|---|
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.1 | 1996 | 70.65 | 4671 |
| | | | | | | |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.2 | 1996 | 67.5 | 4700 |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.2 | 1997 | 69.01 | 4700 |
| | | | | | | |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.3 | 1997 | 67.1 | 4731 |
| | | | | | | |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.4 | 1996 | 56.9 | 4769 |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.4 | 1997 | 59.26 | 4769 |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.4 | 1998 | 61.22 | 4769 |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.4 | 2002 | 61.91 | 4769 |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.4 | 2005 | 61.13 | 4769 |

| 2010 NHD HUC 12 name | 2010 NHD HUC 12 | Creek | Hobo number | Survey Yr | District Av. 7 day | Elevation (ft) |
|---|---|---|---|---|---|---|
| | | | | | | |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.5 | 1998 | 56.54 | 5094 |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.5 | 2002 | 57.37 | 5094 |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.5 | 2003 | 57.53 | 5094 |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.5 | 2005 | 55.22 | 5094 |
| | | | | | | |

b. Water Depths

The only water depth data available is at the hobo locations (**Table 7-12**). Only the years with depth data are provided. Several of these sites do not show up in Table 1 above because the hobos failed that year and temperature data was not collected Boulder.93C.1, Boulder.93C.2 and Boulder.93C.3 do not show up in Table 2 because no water depth data were collected for those years with temperature data.

**Table 7-12**
**Water depths at hobo sites on Boulder Creek at installation and removal in the vicinity of Tetra Alpha**

| Hobo number | Survey Yr | Elevation (ft) | water depth at installation (inches) | water depth at removal (inches) | Installation Date | Removal Date |
|---|---|---|---|---|---|---|
| Boulder.93C.4 | 1998 | 4769 | 14.4 | 9.6 | July 6 | Oct 1 |
| Boulder.93C.4 | 1999 | 4769 | 18 | 6 | June 17 | Sept 21 |
| Boulder.93C.4 | 2002 | 4769 | 12 | 7.2 | July 2 | Oct 8 |
| Boulder.93C.4 | 2003 | 4769 | 14.4 | 6 | June 24 | Oct 21 |
| Boulder.93C.4 | 2005 | 4769 | 12 | 7.2 | June 29 | Oct 13 |
| | | | | | | |
| Boulder.93C.5 | 1998 | 5094 | 20.4 | 7.2 | July 7 | Oct 1 |
| Boulder.93C.5 | 1999 | 5094 | 26.4 | 4.8 | June 17 | Sept 21 |
| Boulder.93C.5 | 2002 | 5094 | 12 | 7.2 | July 2 | Oct 8 |
| Boulder.93C.5 | 2003 | 5094 | 14.4 | 6 | June 24 | Oct 21 |
| Boulder.93C.5 | 2005 | 5094 | 10.8 | 6 | July 1 | Oct 13 |

Water depths decreased in all cases between the time when the hobos were installed and removed indicating a reduction in stream flow. Water depths were as low as about 5 inches at

these sites. Because hobos are located in pools, water depths here are likely some of the deepest along the stream.

c. Stream Flow

There are no stream gages on Boulder Creek. Therefore, stream hydrographs from six stream gages around the area were examined for the period of June 10 through Sept 30 for 2007 (a low flow year) and 2013 to look for patterns of flow (*project file)*. Drainage areas for these stream gages ranged from 7 sq. miles up to 121 sq. miles. The stream hydrographs were examined to determine when stream flows were reflecting groundwater inputs only (base flows) and would therefore be at their lowest. While there was some variability between years and stations, stream low flows tend to occur between early to mid-July through early to late September. Therefore, any water withdrawals during this time would be occurring when the flows would be at their lowest.

Predictions regarding climate change for the Blue Mountains are for increased periods of drought, reductions in snowpacks, and a shift in the timing of peak flows to earlier in the year (Luce et al 2013; Science Briefing 2014). Under these conditions, stream flows are expected to decrease during the summer months, the initiation of summer low flows may occur sooner (i.e. from early-mid July to sometime in June), and stream temperatures may increase. An additional impact is that some streams may change from perennial to intermittent flow.

No stream flow data exists for this stream. However, **Table 7-12** above suggests a reduction in stream flow during the summer as water depths at hobo locations decrease. As noted above in the water depth section, hobos are located in pools and therefore those depths often represent some of the deeper places along the stream, at least in those areas.

*Conclusions*

The available data show that currently stream depths are low in the summer and stream temperatures on Boulder Creek exceed the ODEQ temperature standard. While stream flow data is absent the reduction in water depths at hobo location over the course of the summer document decreasing flows and the low water depths suggest low flow. Therefore, the miner's proposal to withdraw up to 0.2 cfs during the summer has the potential to 1) increase stream temperatures downstream, 2) decrease water depths downstream, and/or 3) dry up the stream below the operation. The magnitude of the impact would vary as a function of climate and flow conditions that year and prior years. Therefore, under Alternative 2, the Plan would not be in compliance with the John Day Basin TMDL.

# ALTERNATIVE 3
# Water Resources
## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*Stage 1 site (downstream site):*

Different than Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** with the addition of a Forest Service WRPM (Appendix 1A) that clarifies where the 25 foot buffer measurement begins. This WRPM, which clarifies the Plan-specific buffer, places the mining activity behind the tailings that line the meadow edge and effectively prevents sediment from entering the meadow and creek.

*Stage 2 site (upstream site):*

Different than Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** as a result of the addition of Forest Service WRPMs (Appendix 1A). One WRPM clarifies the Plan-specific buffer and places it up on the hillslope with 25 feet between the meadow and the activity. The other WRPM requires placement of a straw bale berm at the base of the hillslope. Both the intervening ground cover and the straw bales would ensure that no sediment generated by the activity would reach the creek or wet meadow.

Ponds: Same as Alternative 2. No potential for a discharge.

Fords

*Lower existing ford*

Different than Alternative 2. Under Alternative 3, the discharge potential of the LOWER ford **would be eliminated** because of the addition of Forest Service WRPMs (Appendix 1A) that would require that the ford approaches be rocked to prevent the fine sediment from entering Boulder Creek.

*Middle proposed ford*

Different than Alternative 2. Under Alternative 3, the discharge potential related to the construction and use of the MIDDLE ford **would be eliminated** with the addition of the Forest Service WRPM (Appendix 1A) which would limit access to the Stage 2 area via the upper ford site.

*Upper proposed ford*

Different than Alternative 2. Under Alternative 3, the discharge potential related to the construction and use of the UPPER ford **would be eliminated** because of the addition of Forest Service WRPMs (Appendix 1A) which specific how the ford will be constructed and rocked to prevent sediment from reaching the stream.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

*Forest Service closed road 7355-011.*

Same as Alternative 2. No potential for a discharge.

*Proposed TA roads 7355-M3a, M3b, M3c, M3d (except meadow portion*):

Same as Alternative 2. No potential for a discharge.

*Proposed TA road M3d (meadow portion*):

Different than Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** related to the construction and use of the miner access road that crosses the meadow by the addition of a Forest Service WRPM (Appendix 1A) that would require that the portion of the road that is within 25 feet of the creek be rocked. Rocking would eliminate the sediment source.

**Clean Water Act, Section 303(d)** (antidegradation)

Boulder Creek is not 303(d) listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) an existing pond, 2) one FS closed road, 3) one existing temporary access road and 4) four proposed TA roads.

Ponds

*Source water pond*

Same as Alternative 2. Use of the pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Settling ponds*

Same as Alternative 2. Use of the pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Access Roads

*Forest Service closed road 7355-011*

Same as Alternative 2. Use of this road would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*TA Road 7355-M3a (existing)*

Same as Alternative 2. Use of this road would be in compliance. See Appendix 3 for detailed discussion.

*TA Roads 7355-M3b, M3c, and most of M3d (except meadow portion) (proposed)*

Different than Alternative 2. Under Alternative 3, creation and use of the proposed TA roads would be in compliance with MM-2 as a result of the addition of Forest Service WRPMs (Appendix 1A) and General Requirements Z1-14 and R13 (Appendix 2). See Appendix 3 for detailed discussion.

*TA Road 7355-M3d (meadow segment) (proposed)*

Different than Alternative 2. Under Alternative 3, creation and use of the proposed TA roads would be in compliance with MM-2 as a result of the addition of Forest Service WRPMs (Appendix 1A) and General Requirements Z1-14 and R13 (Appendix 2). See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. No changes in the RMO parameters.

**Wetlands and Floodplains**

Different than Alternative 2. Under Alternative 3, the Plan would be in compliance with Executive Order 11988 (Protection of Floodplains) and Executive Order 11990 (Protection of Wetlands) as a result of the addition of Forest Service WRPMs and General Requirements (Z1 through Z14). These requirements eliminate the potential for road erosion by rocking portions of the road, locating the rock with input from Forest Service personnel, and ensuring appropriate reclamation when no longer needed.

**Other Potential Water Resource Impacts**

Stream flow and stream temperature alteration related to water withdrawals

Different than Alternative 2. There would be a reduction in the time frame of potential effects related to water withdrawals from Boulder Creek as a result of the addition of two Forest Service Fish Protection Measures (Fish PMs) which are listed under the Forest Service WRPMs (Appendix 1A). Under these Fish PMs, water can only be withdrawn from Boulder Creek 1) prior to August 15 and 2) if there was stream flow below the area being worked prior to and after water was withdrawn. Therefore, potential effects to stream temperatures and stream flow would occur for a shorter period (early-mid July through August 14) rather than early-mid July through September 30). However, withdrawals would still occur during the period when stream temperatures are the highest (Appendix 5C) and water depths and stream flows are the lowest. Therefore, water withdrawals prior to August 14 still have the potential to 1) increase stream temperatures downstream, 2) decrease water depths downstream, and/or 3) dry up the stream below the operation, just for a shorter period of time. However, despite the addition of the Forest Service Fish PMs and the WRPMs under Alternative 3, the Plan would still not be in compliance with the John Day Basin TMDL.

# Tetra Alpha Mill and Lode

**Plan type**: Lode
**Subwatershed:** Upper Granite (HUC 170702020201)
**Subwatershed size:** 9,312 acres
**Analysis area:** 2 acres
**Creek**: Boulder Creek (perennial flow and fish-bearing)
**Stream Order:** 3rd
**303(d) listed:** No
**Suction Dredging:** No
**Essential Salmon Habitat:** Yes

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

No potential for a discharge because 1) the adit to be mined is upslope of Forest Service road 7355-020 which is an effective sediment trap, 2) the road is more than 100 feet from the creek, and 3) the adit is dry. Lode rock will be moved to the Tetra Alpha mill site for processing.

Ponds

*Source water pond*

No potential for a discharge via surface or subsurface flow because only withdrawing water from an existing pond.

*Settling ponds*

No potential for discharge via surface flow into Boulder Creek from the existing Tetra Alpha Mill ponds because the ponds has a large capacity, are dug into the ground and separated from the creek by the mine access road.

However, there would be a potential for a discharge via subsurface flow of **heavy metals** into Boulder Creek as a result of use of the settling ponds for the following reasons: 1) The ponds are separated from Boulder Creek by road fill and a floodplain. However, water in the settling ponds has the potential to seep through the road fill sediments adjacent to the creek and move heavy metals in solution into the active floodplain. During the spring high flow, these heavy metals would then be moved into the creek.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Miner proposes to use 1) one Forest Service closed road to the mill site, 2) two existing TA roads in the mill site area, and 3) one existing TA road to access the lode site (Appendix 6). All are native surface roads.

*Forest Service road 7355-011 (Mill site area)*

No potential for a discharge related to use of this existing road because the road is separated from the creek by 50 feet. The intervening ground is composed of lush grasses and forbs. This ground cover type would effectively trap any sediment that exits the road would prevent it from reaching the creek.

*TA Road 7355-M4a (Mill site area)*

No potential for a discharge related to use of this existing road because this is separated from the creek by 140 feet. In addition, FS 7355-011 is between this road and the creek and 56 feet of vegetated ground exists between the two roads. The distance from the creek, the presence of FS 7355-011 and the ground cover would effectively trap any sediment that exits the road would prevent it from reaching the creek.

*TA Road 7355-M4b (Mill site area)*

No potential for a discharge related to use of this existing road because this is separated from the creek by 50 to 140 feet. It connects FS 7355-011 and TA road 7355-M4a. The distance from the creek and the intervening ground cover would effectively trap any sediment that exits the road would prevent it from reaching the creek.

*TA Road 7355-E1a (Lode adit access)*

No potential for a discharge related to use of this existing road because this road is more than 300 feet from Boulder Creek and there is a FS open road and ground cover between the TA road and the creek.

**Clean Water Act, Section 303(d)** (antidegradation)

Boulder Creek is not 303(d) listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mill site that were evaluated for compliance with MM-2 are 1) existing source water pond, 2) existing settling ponds (dry depressions), 3) one FS closed road, and 4) two existing temporary access roads (TA roads 7355-M4a and M4b).

TA road 7355-E1a which is used to access the Lode adit is outside the RHCA and not discussed further with respect to compliance with MM-2.

Ponds

*Source water pond*

Use would be in compliance with MM-2 because only water would be withdrawn. Therefore, no impacts water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*Settling ponds (dry depressions)*

Use of the ponds would NOT be in compliance with MM-2 because there are potential impact to impacts water quality as a result of heavy metals in solution going into Boulder Creek. No impacts to inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Access roads

*Forest Service road 7355-011 (Mill site area)*

Use of this road would be in compliance with MM-2 because no impacts water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*TA Road 7355-M4a and M4b (Mill site area)*

Use of these TA roads would be in compliance with MM-2 because no impacts water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* No changes in *Pool Frequency* would occur as a result of the proposed activities for the following reasons: 1) The potential inputs of fine sediment under Alternative 2 would be small and would move through the system as suspended load, 2) no changes to large woody recruitment are expected (see below), and 3) no suction dredging is proposed.

*Water Temperature:* No changes in *Water Temperature* would occur because 1) there would be no activity in the channel or on the stream banks which would alter channel width and therefore change flow depths for a given discharge, and 2) no trees are proposed for removal.

*Large Woody Debris:* No changes would occur in *Large Woody Debris* recruitment or existing wood in the stream because 1) no trees are proposed for removal and 2) there would be no activity in the channel to alter existing amounts.

*Substrate Sediment:* No changes in *Substrate Sediment* because 1) no suction dredging is proposed, 2) no other inchannel activity is proposed, and 3) the potential inputs of fine sediment would be small and would move through the system as suspended load and not alter the substrate.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* would occur for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability* and therefore no increase in channel width and 2) no instream activity which could trigger a headcut and therefore increase channel depths.

**Wetlands and Floodplains**

No activity is proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

<u>Stream flow and stream temperature alteration related to water withdrawals</u>

The miner proposes to use water from an existing pond in Last Chance Creek for processing placer material. The pond is the result of past mining which created a berm across the stream. In addition, the miner proposes to withdraw water from Boulder Creek, if necessary, to supplement the water in the pond water (i.e. make up water). Based on the pump size (10 HP

3" pump), the pump would withdraw approximately 100 gallons per minute or 0.2 cfs. This is the amount that is assumed would be withdrawn from Boulder Creek if the pond needed make up water and is what is analyzed below for effects.

*Background*

The potential effects of withdrawing water from Boulder Creek on stream flow and stream temperatures were assessed using 1) stream temperature data, 2) water depths taken during the installation and removal of the stream temperature monitors (hobos), and 3) examination of several stream gages from the larger area to determine the timing of summer low flows which are the result of groundwater inputs only.

a. Stream Temperatures

The ODEQ stream temperature standard for Boulder Creek is 53.6*F. There are five stream temperature monitors (hobos) on Boulder Creek. The 7-day running average of the maximum daily stream temperatures for the years with data exceed ODEQ standard at all sites (**Table 7-13**). The Last Chance pond currently proposed for use as the processing pond and for source water is located between hobos Boulder.93C.1 and Boulder.93C.2.

**Table 7-13**
**7-day running average of the maximum daily stream temperature of Boulder Creek for years with temperature data in the vicinity of Tetra Group**

| 2010 NHD HUC 12 name | 2010 NHD HUC 12 | Creek | Hobo number | Survey Yr | District Av. 7 day | Elevation (ft) |
|---|---|---|---|---|---|---|
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.1 | 1996 | 70.65 | 4671 |
| | | | | | | |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.2 | 1996 | 67.5 | 4700 |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.2 | 1997 | 69.01 | 4700 |
| | | | | | | |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.3 | 1997 | 67.1 | 4731 |
| | | | | | | |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.4 | 1996 | 56.9 | 4769 |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.4 | 1997 | 59.26 | 4769 |

| 2010 NHD HUC 12 name | 2010 NHD HUC 12 | Creek | Hobo number | Survey Yr | District Av. 7 day | Elevation (ft) |
|---|---|---|---|---|---|---|
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.4 | 1998 | 61.22 | 4769 |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.4 | 2002 | 61.91 | 4769 |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.4 | 2005 | 61.13 | 4769 |
| | | | | | | |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.5 | 1998 | 56.54 | 5094 |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.5 | 2002 | 57.37 | 5094 |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.5 | 2003 | 57.53 | 5094 |
| Upper Granite Creek | 170702020201 | Boulder | Boulder.93C.5 | 2005 | 55.22 | 5094 |
| | | | | | | |

b. Water Depths

The only water depth data available is at the hobo locations (**Table 7-14**). Only the years with depth data are provided. Several of these sites do not show up in Table 1 above because the hobos failed that year and temperature data was not collected. Boulder.93C.1, Boulder.93C.2 and Boulder.93C.3 do not show up in **Table 7-14** because no water depth data were collected for those years with temperature data.

**Table 7-14**
**Water depths at hobo sites on Boulder Creek at installation and removal in the vicinity of Tetra Group**

| Hobo number | Survey Yr | Elevation (ft) | water depth at installation (inches) | water depth at removal (inches) | Installation Date | Removal Date |
|---|---|---|---|---|---|---|
| Boulder.93C.4 | 1998 | 4769 | 14.4 | 9.6 | July 6 | Oct 1 |
| Boulder.93C.4 | 1999 | 4769 | 18 | 6 | June 17 | Sept 21 |
| Boulder.93C.4 | 2002 | 4769 | 12 | 7.2 | July 2 | Oct 8 |
| Boulder.93C.4 | 2003 | 4769 | 14.4 | 6 | June 24 | Oct 21 |
| Boulder.93C.4 | 2005 | 4769 | 12 | 7.2 | June 29 | Oct 13 |
| | | | | | | |
| Boulder.93C.5 | 1998 | 5094 | 20.4 | 7.2 | July 7 | Oct 1 |
| Boulder.93C.5 | 1999 | 5094 | 26.4 | 4.8 | June 17 | Sept 21 |
| Boulder.93C.5 | 2002 | 5094 | 12 | 7.2 | July 2 | Oct 8 |

| Hobo number | Survey Yr | Elevation (ft) | water depth at installation (inches) | water depth at removal (inches) | Installation Date | Removal Date |
|---|---|---|---|---|---|---|
| Boulder.93C.5 | 2003 | 5094 | 14.4 | 6 | June 24 | Oct 21 |
| Boulder.93C.5 | 2005 | 5094 | 10.8 | 6 | July 1 | Oct 13 |

Water depths decreased in all cases between the time when the hobos were installed and removed indicating a reduction in stream flow. Water depths were as low as about 5 inches at these sites. Because hobos are located in pools, water depths here are likely some of the deepest along the stream.

c. Stream Flow

There are no stream gages on Boulder Creek. Therefore, stream hydrographs from six stream gages around the area were examined for the period of June 10 through Sept 30 for 2007 (a low flow year) and 2013 to look for patterns of flow (*project file)*. Drainage areas for these stream gages ranged from 7 sq. miles up to 121 sq. miles. The stream hydrographs were examined to determine when stream flows were reflecting groundwater inputs only (base flows) and would therefore be at their lowest. While there was some variability between years and stations, stream low flows tend to occur between early to mid-July through early to late September. Therefore, any water withdrawals during this time would be occurring when the flows would be at their lowest.

Predictions regarding climate change for the Blue Mountains are for increased periods of drought, reductions in snowpacks, and a shift in the timing of peak flows to earlier in the year (References). Under these conditions, stream flows are expected to decrease during the summer months, the initiation of summer low flows may occur sooner (i.e. from early-mid July to sometime in June), and stream temperatures may increase. An additional impact is that some streams may change from perennial to intermittent flow.

No stream flow data exists for this stream. However, Table 3 above captures a reduction in stream flow during the summer as water depths at hobo locations decrease. As noted above in the water depth section, hobos are located in pools and therefore those depths often represent some of the deeper places along the stream, at least in those areas.

*Conclusions*

The available data show that currently stream depths are low in the summer and stream temperatures on Boulder Creek exceed the ODEQ temperature standard. While stream flow data is absent the reduction in water depths at hobo location over the course of the summer document decreasing flows and the low water depths suggest low flow. Therefore, the miner's proposal to withdraw up to 0.2 cfs during the summer has the potential to 1) increase stream temperatures downstream, 2) decrease water depths downstream, and/or 3) dry up the stream below the operation. The magnitude of the impact would vary as a function of climate and flow

conditions that year and prior years. Therefore, under Alternative 2, the Plan would not be in compliance with the John Day Basin TMDL.

# ALTERNATIVE 3
# Water Resources
## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

Same as Alternative 2. No potential for a discharge

Ponds

*Source water pond*

Same as Alternative 2. No potential for a discharge.

*Settling ponds*

Surface flow*:* Same as Alternative 2. No potential for a discharge.

Subsurface flow*:* Different from Alternative 2. Under Alternative 3, the discharge potential via subsurface flow **would be eliminated** for two reasons: 1) Forest Service General Requirement L5 (Appendix 2) requires that the first run of any lode material be tested for heavy metals. 2) If the lode material from the first run or subsequent material found that the ore has the potential to release acidity or other contaminates into the ground and into Boulder Creek, then a Forest Service WRPM (Appendix 1A) would apply in which the miner would cease activity until he had submitted a supplement to their plan that detailed how they would prevent heavy metals from entering Boulder Creek. This supplement would then be evaluated and additional Forest Service WRPMs put into place to ensure that there would not be a discharge.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Miner proposes to use 1) one Forest Service closed road to the mill site, 2) two existing TA roads in the mill site area, and 3) one existing TA road to access the lode site (Appendix 6). All are native surface roads.

*Forest Service road 7355-011 (Mill site area)*

Same as Alternative 2. No discharge potential

*TA Road 7355-M4a (Mill site area)*

Same as Alternative 2. No discharge potential

*TA Road 7355-M4b (Mill site area)*

Same as Alternative 2. No discharge potential

*TA Road 7355-E1a (Lode adit access)*

Same as Alternative 2. No discharge potential

**Clean Water Act, Section 303(d)** (antidegradation)

Boulder Creek is not 303(d) listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mill site that were evaluated for compliance with MM-2 are 1) existing source water pond, 2) existing settling ponds (dry depressions), 3) one FS closed road, and 4) two existing temporary access roads (TA roads 7355-M4a and M4b).

TA road 7355-E1a which is used to access the Lode adit is outside the RHCA and not discussed further with respect to compliance with MM-2.

Ponds

*Source water pond*

Same as Alternative 2. Use would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Settling ponds (dry depressions)*

Different than Alternative 2. Under Alternative 3, use of the ponds would be in compliance with MM-2 because the potential for a discharge of heavy metals in solution a **would be eliminated** as a result of the addition of Forest Service General Requirements (Appendix 2) which address lode mining and testing lode material for heavy metals and WRPMs (Appendix 1A) which ensures that sediment containing heavy metals is not placed in the settling ponds. See Appendix 3 for detailed discussion.

Access roads

*Forest Service road 7355-011 (Mill site area)*

Same as Alternative 2. Use of this road would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*TA Road 7355-M4a and M4b (Mill site area)*

Same as Alternative 2. Use of these two roads would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. No changes in the RMO parameters.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

Stream flow and stream temperature alteration related to water withdrawals

Different than Alternative 2. There is a reduction in the time frame of potential effects related to water withdrawals from Boulder Creek as a result of the addition of two Forest Service Fish Protection Measures (Fish PMs) which are listed under the Forest Service WRPMs (Appendix

1A). Under these Fish PMs, water can only be withdrawn from Boulder Creek 1) prior to August 15 and 2) if there was stream flow below the area being worked prior to and after water was withdrawn. Therefore, potential effects to stream temperatures and stream flow would occur for a shorter period (early-mid July through August 14) rather than early-mid July through September 30). However, withdrawals would still occur during the period when stream temperatures are the highest (Appendix 5C) and water depths and stream flows are the lowest. Therefore, water withdrawals prior to August 14 still have the potential to 1) increase stream temperatures downstream, 2) decrease water depths downstream, and/or 3) dry up the stream below the operation, just for a shorter period of time. However, despite the addition of the Forest Service Fish PMs and WRPMs, the Plan would still not be in compliance with the John Day Basin TMDL.

# Troy D

**Plan type**: Placer
**Subwatershed:** Lower Granite (HUC 170702020206)
**Subwatershed size:** 20,282 acres
**Analysis area:** 8 acres
**Creek**: Granite Creek (perennial flow and fish-bearing)
**Stream Order:** 5th
**303(d) listed:** Yes for sedimentation
**Suction Dredging:** No
**Essential Salmon Habitat:** Yes

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

No potential for a discharge because the mining area is separated from the creek by 136 feet of flat ground and is behind an old placer tailings berm. Both the flat ground and the tailings berm are effective sediment traps.

Ponds

*Source water pond*

No potential for a discharge via surface or subsurface flow related to use of the large pond as a source pond because only withdrawing water. However, the pond would also be used as the settling pond and there are potential impacts related to use as a settling pond.

*Settling ponds*

Surface flow*:* No potential for a discharge via surface flow from use of the large pond into Granite Creek because the ponds are dug into the ground and are separated from the creek by approximately 136 feet and a berm of old tailings that line the creek.

Subsurface flow*:* Potential for a discharge via subsurface flow from the ponds into the creek, even though they are 100 to 136 feet away from the creek, because 1) the ponds are in old placer tailings which are expected to have a high permeability and large pores which would allow both sediment and water to move through the subsurface, 2) ponds are elevationally above the creek, and 3) the presence of water in the large pond indicates groundwater flow through the ponds, and towards the creek.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

The miner proposes to use two existing temporary access roads (Appendix 6). They are composed of old placer tailings.

No potential for a discharge from use of these roads because they are more than 136 feet from the creek, on flat ground, behind the old tailings berm, and have very limited fines.

**Clean Water Act, Section 303(d)** (antidegradation)

Granite Creek is 303(d) listed for sedimentation by ODEQ. Sedimentation is defined by ODEQ as: "The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry…."

The activities proposed in this Plan would not alter the existing water quality condition for which this stream is listed for the following reason. There would be no potential for increased sedimentation from the proposed activities despite the potential inputs of fine sediment due to mining-related activities on land because the sediment would move through the system as suspended load and not settle out on the channel bed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) one pond which would be used as both a source water pond and a settling pond, 2) two existing temporary access (TA) roads.

Ponds

*Source water pond*

Use of the large pond as a source water pond would be in compliance with MM-2 because the miner would only be withdrawing water from the pond. Therefore, there would be no impacts

water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion,

*Settling pond*

The large pond would also be used as the settling pond. Use of this pond as a settling pond would NOT be in compliance with MM-2 because there is the potential for impacts to water quality as a result of sediment moving into Granite Creek via subsurface flow. See Appendix 3 for detailed discussion.

Access Roads

Use of the existing TA roads would be in compliance with MM-2 because no impacts water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* No changes in *Pool Frequency* would occur as a result of the proposed activities for the following reasons: 1) the potential inputs of fine sediment under Alternative 2 would be small and move through the system as suspended load, 2) no changes to large woody recruitment are expected (see below), and 3) no suction dredging is proposed.

*Water Temperature:* No changes in *Water Temperature* would occur because 1) there would be no activity in the channel or on the stream banks which would alter channel width and therefore change flow depths for a given discharge, and 2) no stream-side trees would be cut.

*Large Woody Debris:* No changes would occur in *Large Woody Debris* recruitment or existing wood in the stream because 1) no trees are proposed to be cut, and 2) there would be no activity in the channel to alter existing amounts and distributions.

*Substrate Sediment:* No changes in *Substrate Sediment* because 1) no suction dredging is proposed, 2) no other inchannel activity is proposed, and 3) the potential inputs of fine sediment would be small and would move through the system as suspended load and not alter the substrate.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* would occur for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability* and therefore no increase in channel width and 2) no instream activity which could trigger a headcut and therefore increase channel depths.

**Wetlands and Floodplains**

No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# ALTERNATIVE 3
# Water Resources
## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

Same as Alternative 2. No discharge potential.

Ponds

*Source water pond*

Same as Alternative 2. No potential for a discharge.

*Settling ponds*

Surface flow: Same as Alternative 2. No potential for a discharge.

Subsurface flow: Different than Alternative 2. Discharge potential via subsurface flow **would be eliminated** as a result of the addition of Forest Service WRPMs (Appendix 1A). One WRPM would require that 1) Pond A be used only as a source water pond and 2) Pond B be used as the settling pond. The other WRPM would create a buried barrier between the pond and the creek. The barrier would decrease the permeability of the settling ponds and prevent the sediment from leaving the pond and moving through the subsurface to the creek (Appendix 1A and 1C).

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No potential for a discharge.

**Clean Water Act, Section 303(d)** (antidegradation)

Same as Alternative 2. Granite Creek is listed for sedimentation and the activities proposed in this Plan would maintain the existing water quality condition for which this stream is listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) one pond which would be used as both a source water pond and a settling pond, 2) two existing temporary access (TA) roads.

Ponds

*Source water pond*

Same as Alternative 2. Use of the large pond as a source water pond would be in compliance with MM-2. See Appendix 3 for detailed discussion,

*Settling pond*

Different than Alternative 2. Under Alternative 3, Pond A would only be used as a source water pond and Pond B (the smaller pond) would be used as the settling pond. In this new settling pond, a Forest Service WRPM would be added to eliminate the potential for a water quality impact by creating a localized buried barrier to subsurface groundwater and sediment movement. As a result the new settling pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

If Pond B needed to be enlarged, this construction would also be in compliance with MM-2. There would be no impacts to streams or the RHCA because the pond is in old tailings and 136 feet from the creek.

Access Roads

Same as Alternative 2. Use of the existing TA roads would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. No changes in the RMO parameters.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# Yellow Gold

**Plan type**: Placer
**Subwatershed**: Upper Granite (HUC 170702020201)
**Subwatershed size:** 9,312 acres
**Analysis area:** 9 acres
**Creek**: Last Chance Creek (perennial flow and non fish-bearing). Now a series of ponds.
**Stream Order:** N/A. This drainage is now a series of ponds due to past mining activity which built berms across the creek and valley bottom and possibly dredged the valley bottom.
**303(d) listed:** No
**Suction Dredging:** No
**Essential Salmon Habitat:** No

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

**FS NOTE:** Last Chance Creek in this area is NOT a creek but has converted to a pond and wetland complex as the result of the presence of an earthen dam that was built during past historic mining.

Mining Activity

*West Site*

No potential for a discharge related to mining activity at this site because 1) activity is at least 160 feet from Last Chance Creek, 2) located on flat ground, and 3) has Forest Service road 7355-020 between the activity and the creek. Ground cover is limited to some needles and downed wood. The fillslope of the road slopes directly into the Last Chance Creek/pond. However, the combination of the mining distance from the creek, the flat topography in the area to be mined and the road would effectively trap any sediment that exited the mining area prior to the sediment reaching the fillslope and the creek.

*East Site*

***Portion 1***

Potential for a discharge into the creek/pond and wetland area located between the two-track road (road 7355-E2a) and the creek because the description of the miner-proposed 25-foot buffer zone is not specific enough to determine effectiveness. in preventing a discharge of sediment into the creek. Depending on the starting point the miner intended to use when

measuring 25 feet from the creek, there may or may not be a potential for a discharge. As a result of this uncertainty, the worst-case scenario was used is assessing potential water quality impacts (**Appendix 1B, Figure 3, Point A**). In scenario A, there would be a discharge potential.

***Portion 2***

No discharge potential as a result of mining in the portion 2 area. The remaining portions of the East site to be mined are on the east side of 7355-E2a and the combination of ground cover and the two-track road and the distance from the creek (35 feet) would effectively trap any sediment that exited the mining area prior to the sediment reaching the creek.

Ponds

*Source water pond*

No potential for a discharge via surface or subsurface flow because only withdrawing water from an existing pond.

*Settling ponds*

Potential for a discharge **could not be determined** under Alternative 2 because the locations of the proposed ponds on the Plan map were not specific enough to determine how the close the ponds would be to the stream and the type of material that the ponds would be constructed in (e.g. permeable old placer tailings vs. sediments with a lot of fines).

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Miner proposes to use five Forest Service closed roads and one existing Temporary Access road (Appendix 6). They are all native surface roads.

*Forest Service closed roads*

No potential for a discharge related to use of any of these Forest Service closed roads because the roads are separated from the creek by well-vegetated ground composed of needles, grasses, forbs and downed wood. This ground cover would effectively trap any sediment that exits these roads prior to reaching the creek/pond. See Appendix 3 for detailed discussion.

*Existing TA road 7355-E2a*

No potential for a discharge related to use of this TA road because 1) this road is a two-track road that makes its way down to Last Chance Creek and part of the area to be mined, 2) is separated from Last Chance Creek by 35 feet at its closest, and 3) the intervening ground cover is a mix of grasses, forbs, and downed wood. The distance, combined with the limited disturbance and ground cover, are sufficient to effectively trap any sediment that might leave the two-track prior to it reaching the creek. See Appendix 3 for detailed discussion.

Bridges

No potential for a discharge related to installation, removal or use of the foot bridge because 1) the bridge is just going to be planks of wood placed across the creek so that the miners can walk across the creek to the processing site and 2) no disturbance of the ground cover is anticipated. Therefore, no soil would be exposed. See Appendix 3 for detailed discussion.

**Clean Water Act, Section 303(d)** (antidegradation)

Last Chance Creek is not 303(d) listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) an existing source water pond, 2) proposed settling ponds, 3) five Forest Service closed roads, 4) one existing temporary access (TA) road, and 5) a proposed foot bridge.

Ponds

*Source water pond*

Use of the source water pond would be in compliance with MM-2 because water is only going to be withdrawn. Therefore, no would occur to impacts water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*Settling ponds*

Compliance with MM-2 could NOT be evaluated under Alternative 2 because the miner has not located the ponds. Compliance is evaluated only under Alternative 3.

Access Roads

*Forest Service closed roads*

Use of these five existing roads (Appendix 6) would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*Existing TA road 7355-E2a*

Use of this existing TA road would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Bridges

Seasonal installation, removal and use of the proposed foot bridge would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

The RMOs do not apply to this site because Last Chance Creek has an earthen dam in place from past mining and has converted to a pond and wetland complex in this area.

**Wetlands and Floodplains**

No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# ALTERNATIVE 3
## Water Resources
### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

*West Site*

Same as Alternative 2. No potential for a discharge.

*East Site*

***Portion 1:***

Different than Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** because of the addition of Forest Service WRPMs (Appendix 1A). One WRPM clarifies the buffer location and ensures that the activity takes place out of the wetland area. The other WRPM requires that a straw bale berm be installed between the creek and the portion of the mining area between the creek/pond and road 7355-E2a. These two WRPMs ensure that any sediment leaving this area would be trapped prior to reaching the creek and wetland.

***Portion 2:***

Same as Alternative 2. No discharge potential.

Ponds

*West processing site ponds*

Same as Alternative 2. No potential for a discharge.

*East processing site ponds*

Different than Alternative 2. Under Alternative 3, the discharge potential **would be eliminated** as a result of the addition of the Forest Service WRPM (Appendix 1A). This WRPM requires that the ponds be located with input from the Forest Service and protection measures identified and implemented prior to construction and use. This WRPM would be sufficient as there are places in the area identified for ponds which could be used for processing that would not result in a potential for a discharge.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

*Forest Service closed roads*

Same as Alternative 2. No potential for a discharge.

*Existing TA road 7355-E2a*

Same as Alternative 2. No potential for a discharge.

**Clean Water Act, Section 303(d)** (antidegradation)

Last Chance Creek is not 303(d) listed.

**Suction Dredging**

None proposed.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are 1) an existing source water pond, 2) proposed settling ponds, 3) five Forest Service closed roads, 4) one existing temporary access (TA) road, and 5) a proposed foot bridge.

Ponds

*Source water pond*

Same as Alternative 2. Use of the source water pond would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Settling ponds*

Different than Alternative 2. Under Alternative 3, construction and use of the proposed settling ponds would be in compliance with MM-2 because of the addition of a Forest Service WRPM (Appendix 1A) and General Requirement R15 (Appendix 2). As a result of these additions, no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

Access Roads

*Forest Service closed roads*

Same as Alternative 2. Use of these existing five roads would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*Existing TA road 7355-E2a*

Same as Alternative 2. Use of this existing TA road would be in compliance with MM-2. See Appendix 3 for detailed discussion.

Foot Bridge

Same as Alternative 2. Seasonal installation, removal and use of this proposed foot bridge would be in compliance with MM-2. See Appendix 3 for detailed discussion.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. RMOs do not apply.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# Yellow Jacket

**Plan type**: Placer
**Subwatershed**: Beaver Creek (HUC 170702020203)
**Subwatershed size:** 13,075 acres
**Analysis area:** 7.5 acres
**Creek**: Orofino Gulch (intermittent flow, non-fish-bearing)
**Stream Order:** 1st
**303(d) listed:** No
**Suction Dredging:** Yes
**Essential Salmon Habitat**: No

## ALTERNATIVE 2

## Water Resources

### Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

No potential for a discharge as a result of mining activity because there would be a 20-foot no disturbance buffer between mining activity and the gulch because portions of the gulch are lined with old placer tailings. Even given the worst-case scenario in where the miner would measure the 20-foot buffer from, the activity would still be behind the tailings which would effectively trap any sediment generated by the activity.

Ponds

Impacts are not analyzed under direct and indirect effects because the ponds would be on private land. They are discussed under Cumulative Effects in Chapter 3.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use. Existing Temporary Access road crosses Orofino Gulch on private land via a culvert.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

The miner proposes to use two existing Temporary Access road (Appendix 6). They are a mix of native surface and tailings.

*TA road 1305-E1a*

No potential for a discharge because the road is more than 300 feet from any stream channel and occurs through the old tailings.

*TA road 1305-E1b*

Road occurs on private land. Discussed under Cumulative Effects in Chapter 3.

**Clean Water Act, Section 303(d)** (antidegradation)

Orofino Gulch is not 303(d) listed.

**Suction Dredging**

Suction dredging is permitted under the ODEQ 700PM permit (Appendix 4A). This permit has a series of requirements for dredging in any stream with additional requirements for dredging in essential salmon habitat. Orofino Gulch is NOT essential salmon habitat and therefore Schedule C. 16, 17, 18, and 19 of the 700PM permit apply do not apply.

In evaluating suction dredging on Orofino Gulch in the area of the proposed operation impacts to the following parameters were considered: pool frequency and distribution, habitat complexity (e.g. log jams, instream wood, beaver dams), stream temperatures, turbidity, and substrate, and channel bed stability (Appendix 4B, 4C). The analysis assumes that the Plan would be in compliance with the 700PM permit and all its requirements.

Site Characteristics

The channel bed in this area is predominantly cobbles with some gravels and sands and highly stable given the abundance of cobbles. Orofino Gulch was historically placer mined, therefore the percentage of the silts and clays in the channel bed is expected to be limited. The only source of abundant fine-grained material would be the stream banks. However, no mining or destabilizing of the stream banks is permitted under the 700PM permit (Schedule C.5, 6, 7 and 8).

Water Quality and Channel Morphology analysis

*Pool frequency and distribution*: Localized changes would occur in pool locations and frequency related to suction dredging as dredging will create pools and loosen the substrate. The pool created by suction dredging is likely to be permanent because the amount of bedload moving through the stream is limited and the sediment disturbed by suction dredging would be redistributed downstream during high flow events.

*Habitat complexity*: Potential local change to habitat would occur because boulders and habitat structures may be moved around in the stream but not removed. Therefore, the impacts of suction dredging on in-channel habitat complexity may occur but should be limited to small areas. The changes would be permanent

Schedule C.6 prohibits removing or disturbing boulders, rooted vegetation, or embedded woody plants and other habitat structures from the stream banks. Habitat connected to the stream banks (beaver dams, undercuts, root wads etc.) therefore would remain intact thereby ensuring that some key habitat types would not be modified.

*Stream temperatures*: No changes to stream temperatures would occur because suction dredging would not alter stream channel widths, channel depths, remove stream side shade or alter groundwater flows.

*Turbidity*: Local change on water clarity would occur as represented by changes in turbidity. Turbidity could extend beyond the immediate area that is dredged but changes in water clarity are not allowed under the 700 PM permit to extend beyond 300 feet downstream. However, given the past history of placer mining in this stream, fines are expected to be limited in the channel bed and therefore the turbidity plume is expected to dissipate much sooner than 300 feet downstream. In addition, the turbidity plume would only occur when dredging is occurring. Therefore, the temporal impact is limited to the when the miner is suction dredging.

*Substrate:* Local changes in channel bed substrate are expected as a result of suction dredging. Dredging would pull sediment from the channel bed, pass it up through a suction hose, and run it across a recovery system (sluice box) floating at the surface. The gravel and other material, which washes through the recovery system, would then be washed back into the stream. Pools would be created where the sediment was pulled from and small dredge tailings piles created where the gravel and other material was deposited. In some cases the gravel and other material would be put back into the pool and in other cases deposited in the channel but not in the pool. These dredge tailings would be mobilized during the spring high flow and redistributed downstream. The changes in substrate at the dredge pool location would be permanent but highly localized.

*Channel bed stability*: No changes to channel bed stability would occur even though dredging will create pools because the channel bed is composed of cobbles, sand and gravel. Therefore, no headcutting and bed destabilization is expected to occur.

Summary of Effects

The analysis found that suction dredging would have no impact on 1) stream temperature or 2) channel bed stability for the reasons stated above. Suction dredging would have a local impact on 1) pool frequency and distribution, 2) habitat complexity, 3) turbidity and 4) substrate for the reasons stated above. The changes to pool frequency, habitat complexity and substrate are expected to be permanent but limited to the area worked and therefore would not have a

measurable impact on channel complexity or channel stability. Changes in turbidity would impact less than 300 feet of stream and not be permanent but limited to the period of time that the miner is suction dredging.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are an existing temporary access road only. The ponds and TA road 1305-E1b are on private land.

Ponds

N/A. The ponds would be on private land and therefore the question of compliance with MM-2 does not apply.

Access Roads

*TA road 1305-E1a*

Use of this road would be in compliance with MM-2 because no impacts would occur to water quality, inchannel complexity, channel morphology, soils or riparian vegetation. See Appendix 3 for detailed discussion.

*TA road 1305-E1b*

N/A. The road is on private land and therefore the question of compliance with MM-2 does not apply.

**PACFISH: Riparian Management Objective (RMO) Parameters**

*Pool Frequency:* Localized changes would occur in pool locations and frequency related to suction dredging because dredging would create pools and loosen the substrate. The pool created by suction dredging is likely to be permanent because the amount of bedload moving through the stream is limited and the sediment disturbed by suction dredging would be redistributed downstream during high flow events.

No changes would occur to pool frequency related to potential for inputs of fine sediment from mining activity because inputs would move through the system as suspended load and not settle out in the pools. There would be no changes in pool frequency related to *Large Woody Recruitment* because no trees are proposed for removal.

*Water Temperature:* No changes in *Water Temperature* would occur because 1) there would be only very limited removal of trees and none would be shade trees and 2) suction dredging would occur under the requirements established in the ODEQ 700 PM permit which

would ensure that there would not be increased in stream channel widths or channel depths which would alter water depths and influence stream temperatures (Appendix 4A).

*Large Woody Debris:* No changes would occur in *Large Woody Debris* recruitment or existing wood in the stream because 1) no trees are proposed for removal and 2) suction dredging would occur under the requirements established in the ODEQ 700 PM permit. Schedule C.6, 7, and 8 of the permit limits the amount of instream habitat structures that can be moved or altered (Appendix 4A).

*Substrate:* Local changes in channel bed substrate are expected as a result of suction dredging. Dredging would pull sediment from the channel bed, pass it up through a suction hose, and run it across a recovery system (sluice box) floating at the surface. The gravel and other material, which washes through the recovery system, would then be washed back into the stream. Pools would be created where the sediment was pulled from and small dredge tailings piles created where the gravel and other material was deposited. In some cases the gravel and other material would be put back into the pool and in other cases deposited in the channel but not in the pool. These dredge tailings would be mobilized during the spring high flow and redistributed downstream. The changes in substrate at the dredge pool location would be permanent but highly localized.

No changes would occur to substrate sediment as a result of potential for inputs of fine sediment related to mining activity because inputs would move through the system as suspended load.

*Bank Stability:* No changes in *Bank Stability* would occur because 1) no activity would occur on the stream banks and 2) there would be no removal of stream bank vegetation which provides bank stability and resistance to instream erosion.

*Lower Bank Angle:* No changes in *Lower Bank Angle* would occur for the same reasons listed under *Bank Stability.*

*Width/Depth ratio:* No changes in *Width/Depth ratio* would occur because there would be 1) no change to *Bank Stability* and 2) suction dredging would occur under the requirements established in the ODEQ 700 PM permit (Appendix 4A) which prevent dredging of the stream banks and altering stream channel widths. With respect to changes in channel depths, the channel bed composition is a mix of cobbles, sands and gravels and highly stable. Therefore, there would be no potential for suction dredging to trigger a headcut and increase channel depths.

**Wetlands and Floodplains**

No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

# ALTERNATIVE 3
# Water Resources
## Direct and Indirect Effects

**Clean Water Act, Section 401** (potential for a discharge)

Mining Activity

Same as Alternative 2. No potential for a discharge.

Ponds

N/A. Ponds would be on private land. Therefore, the impacts are not analyzed under direct and indirect effects. They are discussed under Cumulative Effects in Chapter 3.

Fords

No fords on closed or decommissioned Forest Service roads or temporary mine access roads proposed for use.

Use of Forest Service Closed and Decommissioned Roads and Creation and/or Use of Temporary Access Roads

Same as Alternative 2. No potential for a discharge from use of road 1305-E1a (on public land). TA road 1305-E1b is on private ground and discussed under Cumulative Effects in Chapter 3.

**Clean Water Act, Section 303(d)** (antidegradation)

Orofino Gulch is not 303(d) listed.

**Suction Dredging**

Same as Alternative 2. The analysis found that suction dredging would have no impact on stream temperature or channel bed stability for the same reasons stated under Alternative 2. Suction dredging would have localized and permanent impacts related to pool frequency and distribution, habitat complexity and substrate and localized but short-term impacts to turbidity for the same reasons stated under Alternative 2.

**PACFISH: MM-2 (structures inside RHCAs)**

Structures related to the mining operation that are evaluated for compliance with MM-2 are an existing temporary access road only. The ponds and TA road 1305-E1b are on private land and discussed under Cumulative Effects in Chapter 3.

Ponds

N/A. Same as Alternative 2. The ponds would be on private land and therefore the question of compliance with MM-2 does not apply.

Access Roads

*TA road 1305-E1a*

Same as Alternative 2. Use of the road would be in compliance with MM-2. See Appendix 3 for detailed discussion.

*TA road 1305-E1b*

N/A. The road is on private land and therefore the question of compliance with MM-2 does not apply.

**PACFISH: Riparian Management Objectives (RMOs)**

Same as Alternative 2. Only *Pool Frequency* and *Substrate Sediment* have the potential to be affected as a result of suction dredging. The changes would be permanent but localized to the area dredged and there would be no measurable changes to these inchannel characteristics even within the Plan analysis area.

**Wetlands and Floodplains**

Same as Alternative 2. No activity proposed in floodplains or wetlands. Therefore, Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetlands) do not apply.

**Other Potential Water Resource Impacts**

None

## Table 7-15
## Cumulative Effects by Plan

| Plan | SWS Name | Cumulative Effects | |
|---|---|---|---|
| | | **Alternative 2** | **Alternative 3** |
| Altona | Beaver | **Potential for a discharge:** NO cumulative effects to water resources, despite there being potential for a discharge of sediment (direct effect), for the following three reasons. First, the portion of stream potentially impacted by a discharge of sediment would not overlap in time AND space impacts to water quality related to past harvest, mining, grazing, or road building activities. Impacts as a result of these past activities have since stabilized and are no longer contributing new sediment. Second, the portion of stream potentially impacted does not overlap in time AND space impacts from present day activities because there is no current grazing, mining, logging, or road building ongoing in this area. Finally, there are no reasonably foreseeable activities proposed in this area that might alter water quality.<br><br>The reasonably foreseeable mining operation is Belvadear Placer which is located about 1 mile downstream of Altona Placer. Therefore, there would be no overlap in time AND space because the distance between the areas proposed for activity are much greater ( 1 mile) than the length of the potential water quality impact (< 300 feet at most). | **Potential for a discharge:** NO cumulative effect but for a different reason than Alternative 2. The addition of FS WRPMs eliminates the potential for a discharge. Therefore, no direct/indirect effects under this alternative. |
| Belvadear | Beaver | **Potential for a discharge:** POTENTIAL for a cumulative effect if a discharge of silts and clays occurs into Olive Creek due to mining activity because it could overlap in time AND space with the impacts related to potential sediment input from Olive Tone. The two operations are within about 1300 feet of each other and both are on Olive Creek. Given the low summer flows and particle sizes, the inputs of these fines has the potential to reduce water clarity for distances greater than 300 feet and might persist even after activity is completed.<br><br>**Wetlands/Floodplains:** NO cumulative effect related to wetland impacts because the direct effects, which are localized, would NOT overlap in time AND space any other wetland impacts.<br><br>**Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to water withdrawals))**: POTENTIAL for a cumulative effect for the following reasons: 1) potential to increase already elevated stream temperature, 2) potential to alter stream flow and cause the stream to go dry sooner, and 3) Olive Tone, located upstream would also be withdrawing water. These changes would overlap in time AND space impacts from Olive Tone and the ongoing elevated stream temperatures and alteration of stream flow due to past activities. These past | **Potential for a discharge:** Different than Alt. 2. NO cumulative effect because of the addition of FS WRPMs (Appendix 1A) BUT to **Olive Tone. Olive Tone** located upstream of Belvadear. The addition of FS WRPMs to **Olive Tone** would eliminate the potential for a discharge of fine sediment and reduction in water clarity due to activities at this site. Therefore, while the potential for a discharge of fine sediment remains for Belvadear, the effects would no longer overlap in time AND space with Olive Tone.<br><br>**Wetlands/Floodplains**: Same as Alt 2. NO cumulative effects<br><br>**Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to water withdrawals)**: |

| Plan | SWS Name | Cumulative Effects | |
|---|---|---|---|
| | | **Alternative 2** | **Alternative 3** |
| | | activities (logging, mining, grazing, road building) have increased channel widths and depths and disconnected the stream-valley floor hydrologic connectivity. Result is that stream flow water depths are shallower for a given discharge, more of the water column is warmed and there is a loss of groundwater inputs because the water table has dropped. | Same as Alt. 2. POTENTIAL cumulative effect to stream temperatures and stream flow remains at the same level as Alternative 2. |
| Blue Sky Bull Run | Bull Run | **Potential for a discharge**: NO cumulative effects despite the potential for a discharge of fine sediment due to mining activities, Swamp Creek ford use and placement of temporary bridge because there are no other activities in the area that are discharging sediment now or in the reasonably foreseeable future and therefore NO overlap in time and space of direct effects. Any inputs of sediment related to replacement of culverts would be limited to less than 6 days with most of the inputs through the system in hours (See Appendix 5 turbidity table) that there still is not considered to have a potential overlap in time and space with future projects.<br><br>**Suction Dredging**: NO cumulative effects to water resources despite local changes in pool frequency and channel substrate because the direct effects of suction dredging would not overlap in time and space changes in pool frequency and channel substrate elsewhere in Bull Run Creek. | **Potential for a discharge**: Same as Alt 2. NO cumulative effects.<br><br>**Suction Dredging**: Same as Alt 2. NO cumulative effects |
| Blue Smoke | Lower Granite | **Suction Dredging**: NO cumulative effects to water resources despite local changes in pool frequency and channel substrate because the direct effects of suction dredging would not overlap in time and space changes in pool frequency and channel substrate elsewhere in Granite Creek. | **Suction Dredging**: Same as Alt 2. NO cumulative effects. |
| Bunch Bucket | Clear | **Potential for a discharge**: NO cumulative effects despite the potential for a discharge of fine sediment due to activity in the small creek and close proximity of Ruby Placer which also has a discharge potential for the following reason. 1) Stream flows on Clear Creek are large relative to the potential input of fines and the effect on water clarity would be diluted. Therefore, there would be no measureable overlap in time and space of direct effects of the operations. | **Potential for a discharge:** Same as Alt 2. NO cumulative effects. |
| City Limits | Upper Granite | NO cumulative effects because no direct/indirect effects to water resources | Same as Alt. 2. NO cumulative effects |
| East 10 Cent | Lower Granite | **Potential for a discharge**: NO cumulative effects despite the potential for a discharge of fine sediment because there are no other activities in the area that are discharging sediment now or in the reasonably foreseeable future and therefore NO overlap in time and space of direct effects. | **Potential for a discharge:** Same as Alt 2. NO cumulative effects. |
| Eddy Shipman | Upper Granite | **Potential for a discharge (sediment):** NO cumulative effects despite the potential for a discharge of fine sediment from use of the ford because the impact would be nonmeasurable given the Granite Creek stream flows compared to the inputs. Therefore, NO overlap in time and space of direct effects. | **Potential for a discharge (sediment):** Same as Alt 2. NO cumulative effects.<br><br>**Potential for a discharge (heavy metals):** Different than Alt. 2. NO cumulative effect as a |

| Plan | SWS Name | Cumulative Effects | |
|---|---|---|---|
| | | **Alternative 2** | **Alternative 3** |
| | | **Potential for a discharge (heavy metals):** POTENTIAL for a cumulative effect related a discharge of heavy metals into Granite Creek, because the old lode tailings which make up the soils in the area have tested high for heavy metals. As groundwater enters these old lode tailings and moves into Granite Creek, it carries with it heavy metals in solution. Therefore, additional heavy metals would overlap in time AND space with heavy metals currently entering Granite Creek from past mining activities.<br><br>**Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to water withdrawals))**: NO cumulative effect related to water withdrawals from Chipman Gulch because the stream flows compared to flows on Granite Creek. The direct effects of withdrawing water would not result in a measureable reduction in stream flows or increase in stream temperatures on Granite Creek. Therefore, there would not be an overlap in time AND space of effects with other withdrawals that could occur on Granite Creek from Make Up, located upstream, or Hopeful 1, located downstream.. | result of the addition of FS General Requirement L5 (Appendix 2). This requirement would eliminate the potential for a discharge of heavy metals and therefore no direct/indirect effects related to this potential impact.<br><br>**Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to water withdrawals):** Same as Alt. 2. NO cumulative effects. |
| Grubsteak | Clear Creek | **Potential for a discharge**: NO cumulative effects despite the potential for a discharge of fine sediment because there are no other activities in the area that are discharging sediment now or in the reasonably foreseeable future. Therefore, NO overlap in time and space of direct effects.<br><br>**Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to groundwater flow reversal)**: POTENTIAL for a cumulative effect related to groundwater reversing its direct of flow from towards Clear Creek to towards the test hole at Site B. Stream temperatures are already elevated as a result of past activities (See Belvadear for discussion) and flows are low in Clear Creek. Therefore, there could be a local increase in stream temperature that would add to the already elevated stream temperatures. If a portion of the stream went dry, there would NOT be a cumulative effect because the portion that would go dry would NOT overlap in time and space any other activity that might cause another portion to go dry in the present or reasonably foreseeable future. | **Potential for a discharge**: Same as Alt 2. NO cumulative effect .<br><br>**Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to groundwater flow reversal):** Different than Alt. 2. NO cumulative effects because of the addition of FS WRPMs which would prevent activity at Site B from drying up the stream in that area and potentially contribute to increased stream temperatures.. |
| Hopeful 1 | Lower Granite | **Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to water withdrawals)**: NO cumulative effects on stream flow or temperature because the Granite Creek stream flows are much greater than the amount of water that would be withdrawn from the creek. Therefore, there would be no measurable change in temperature or flow related to the withdrawal. | **Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to water withdrawals):** Same as Alt 2. NO cumulative effect |

| Plan | SWS Name | Cumulative Effects | |
|---|---|---|---|
| | | **Alternative 2** | **Alternative 3** |
| Hopeful 2&3 | Lower Granite | **Potential for a discharge**: NO cumulative effects despite the potential for a discharge of fine sediment related to the ford, TA 1035-E1d or construction and use of the ponds on the north side of Granite Creek because there are no other activities in the area that are discharging sediment now or in the reasonably foreseeable future and therefore NO overlap in time and space of direct/indirect effects. | **Potential for a discharge:** Same as Alternative 2. NO cumulative effects. |
| L&H | Beaver | **Potential for a discharge**: NO cumulative effects despite the potential for a discharge of heavy metals in solution because there are no other activities in the area that are discharging heavy metals now or in the reasonably foreseeable future. Therefore NO overlap in time and space of direct effects. | **Potential for a discharge**: Same as Alt. 2. NO cumulative effects. |
| Lightning | Clear | **Suction Dredging**: NO cumulative effects to water resources despite local changes in pool frequency and channel substrate because the direct effects of suction dredging would not overlap in time and space changes in pool frequency and channel substrate elsewhere in Lightning Creek.<br><br>**Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to water withdrawals)**: POTENTIAL for a cumulative effect related to withdrawing water from Lightning Creek for the following reasons: 1) There is the potential to increase already elevated stream temperature and 2) cause the stream to go dry. These changes would overlap in time AND space the increase in stream temperatures and alteration of stream flow due to past activities. These past activities (logging, mining, grazing, road building) have increased channel widths and depths and disconnected the stream-valley floor hydrologic connectivity. Result is that stream flow water depths are shallower for a given discharge, more of the water column is warmed and there is a loss of groundwater inputs because the water table has dropped. | **Suction Dredging**: Same as Alt 2. NO cumulative effects<br><br>**Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to water withdrawals):** Similar to Alt. 2. POTENTIAL cumulative effect to stream temperatures and flow remains BUT cumulative effect is now restricted to period of time between July 1 and August 14 as a result of the addition of FS Fish Protection Measures (Appendix 1A). |
| Little Cross | Lower Granite | **Potential for a discharge**: NO cumulative effects despite the potential for a discharge of silts and sands because the closest Plan on Granite Creek which also has the potential for a discharge of sediment is Troy D, which is located about 1/2 mile downstream. The potential alteration of water clarity would not be visible this far downstream because of the large amount of flow in Granite Creek and that the sands would settle out. Therefore, NO overlap in time and space of direct effects.<br><br>**Suction Dredging**: NO cumulative effects to water resources despite local changes in pool frequency and channel substrate because the direct effects of suction dredging would not overlap in time and space changes in pool frequency and channel substrate elsewhere in Granite Creek. | **Potential for a discharge**: Same as Alt. 2. NO cumulative effects.<br><br>**Suction Dredging**: Same as Alt 2. NO cumulative effects |
| Lucky Strike | Clear | NO cumulative effects because no direct/indirect effects to water resources. | Same as Alt. 2. NO cumulative effects because no direct/indirect effects to water resources. |

| Plan | SWS Name | Cumulative Effects | |
|---|---|---|---|
| | | **Alternative 2** | **Alternative 3** |
| Make It | Upper Granite | **Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to water withdrawals)**: NO cumulative effects on either stream flow or temperature because the Granite Creek stream flows are much greater than the amount of water that would be withdrawn from the creek. Therefore, there would be no measurable change in either temperature or flow related to the withdrawal. | **Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to water withdrawals):** Same as Alt. 2. NO cumulative effects |
| Muffin | Upper Granite | **Other Water Resource Potential Impacts (Drying up wet meadow)**: NO cumulative effect because there are no other activities in the area that could dry up a small portion of this meadow. Therefore, there would no overlap of time AND space of effects. | **Other Water Resource Potential Impacts (Drying up wet meadow)**: Same as Alt 2. NO cumulative effect |
| Old Eric 1 and 2 | Upper Granite | **Potential for a discharge**: POTENTIAL for a cumulative effect related to a discharge of warm water from the settling pond into Granite Creek because 1) there is the potential to increase already elevated stream temperature and 2) that increase would overlap in time AND space stream temperatures increases related to past activities. These past activities (logging, mining, grazing, road building) have increased channel widths and depths and disconnected the stream-valley floor hydrologic connectivity. Result is that stream flow water depths are shallower for a given discharge and more of the water column is warmed and there is a loss of groundwater inputs because the water table has dropped.<br><br>**Suction Dredging**: NO cumulative effects to water resources despite local changes in pool frequency and channel substrate because the direct effects of suction dredging would not overlap in time and space changes in pool frequency and channel substrate elsewhere in Granite Creek. | **Potential for a discharge**: Different than Alt 2. Under Alt 3 there would be NO cumulative effects to stream temperatures because the addition of FS WRPMs would eliminate the potential for a discharge of warm water.<br><br>**Suction Dredging**: Same as Alt 2. NO cumulative effects |
| Olive Tone | Beaver | **Potential for a discharge**: POTENTIAL for a cumulative effect if a discharge of silts and clays occurs into Olive Creek due to use of the settling ponds activity because it could overlap in time AND space with the impacts related to potential sediment input from Belvadear Tone. The two operations are within about 1300 feet of each other and both are on Olive Creek. Given the low summer flows and particle sizes, the inputs of these fines has the potential to reduce water clarity for distances greater than 300 feet and might persist even after activity is completed.<br><br>**Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to water withdrawals)**: POTENTIAL for a cumulative effect for the following reasons: 1) potential to increase already elevated stream temperature, 2) decrease stream flow such that the stream goes dry sooner, and 3) is in close proximity to another site (Belvadear) that also proposes to withdraw water. These changes would overlap in time AND space impacts from Olive Tone and the ongoing elevated stream temperatures and alteration of stream flow due to past activities. These past activities (logging, mining, grazing, road building) have increased channel | **Potential for a discharge**: Different than Alt 2. Under Alt 3 there would be NO cumulative effects to turbidity because the addition of FS WRPMs would eliminate the potential for a discharge of sediment and therefore eliminate potential overlap in turbidity plumes between Olive Tone and Belvadear.<br><br>**Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to water withdrawals):** Same as Alt. 2. POTENTIAL for cumulative effect to stream temperatures and stream flow remains at the same level. |

| Plan | SWS Name | Cumulative Effects | |
|---|---|---|---|
| | | **Alternative 2** | **Alternative 3** |
| | | widths and depths and disconnected the stream-valley floor hydrologic connectivity. Result is that stream flow water depths are shallower for a given discharge, more of the water column is warmed and there is a loss of groundwater inputs because the water table has dropped. | |
| Rosebud 1-4 | Lower Granite | NO cumulative effects because no direct/indirect effects to water resources | Same as Alt. 2. No cumulative effects |
| Royal White | Beaver | NO cumulative effects because no direct/indirect effects to water resources | Same as Alt. 2. No cumulative effects |
| Ruby Group | Clear | **Potential for a discharge**: NO cumulative effects despite the potential for a discharge of fine sediment related to mining activity, ford use and road use because the closest Plan on Clear Creek which also has the potential for a discharge of sediment is Bunch Bucket, which is located about ¼ to ½ mile upstream. The potential alteration of water clarity from a discharge of sediment from Bunch Bucket Cross would not be visible at Ruby given the volume of water in Clear Creek and the distance between the two sites. Therefore, there would be NO overlap in time and space of direct effects. | **Potential for a discharge:** Same as Alt 2. NO cumulative effects |
| Sunshine McWillis | Beaver | **Potential for a discharge**: Varies depending on if McWillis Gulch has flow.<br><br>IF McWillis Gulch is dry then NO cumulative effect because any discharge from the ponds or mining site #2 would infiltrate and keep the sediment in the gulch<br><br>IF McWillis Gulch has flow then POTENTIAL cumulative effect because the sediment would be transported downstream into Olive Creek and there are two other operations upstream (Belvadear and Olive Tone) that also have the potential for a discharge of fine sediment. Therefore, there could be a reduction in water clarity that overlaps in time AND space with these two operations.<br><br>**Suction Dredging**: NO cumulative effects to water resources despite local changes in pool frequency and channel substrate because the direct effects of suction dredging would not overlap in time and space changes in pool frequency and channel substrate elsewhere in McWillis Gulch.<br><br>**Wetland/Floodplains**: NO cumulative effect related to impacts in the McWillis Gulch floodplain because the direct effects would be localized and therefore NOT overlap in time AND space any other floodplain impacts. | **Potential for a discharge**: Same as Alt 2. NO cumulative effects<br><br>**Suction Dredging**: Same as Alt 2. NO cumulative effects<br><br>**Wetland/Floodplains**: Same as Alt 2. NO cumulative effects |
| Tetra Alpha Placer | Upper Granite | **Potential for a discharge**: NO cumulative effect related to the potential discharge of sediment from road construction and use of TA 7355-M3d and fords because the closest Plan on Boulder Creek is Tetra Alpha Mill and Lode, located ¼ miles downstream. Tetra Alpha Mill and Lode only has the potential to discharge heavy metals, not sediment, and there are no other Plans on Boulder Creek. Therefore, the effects on water clarity from activity on Tetra Alpha would not overlap in time AND | **Potential for a discharge**: Same as Alt 2. NO cumulative effects<br><br>**Wetlands/Floodplains**: Same as Alt 2. NO cumulative effects |

| Plan | SWS Name | Cumulative Effects | |
|---|---|---|---|
| | | **Alternative 2** | **Alternative 3** |
| | | space with other activity in the drainage..<br><br>**Wetland/Floodplain activity**: NO cumulative effect related to impacts in the wetlands because the direct effects to the wetland meadow would be localized in space and therefore NOT overlap in time AND space any other wetland-related impacts.<br><br>**Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to water withdrawals)**: POTENTIAL cumulative effect on stream temperatures IF water were withdrawn from Boulder Creek because there is the potential to increase already elevated stream temperature and that increase would overlap in time AND space the increase in stream temperatures related to past activities and a reasonably foreseeable future activity (water withdrawal from Boulder Creek by Tetra Group). These past activities (logging, mining, grazing, road building) have increased channel widths and depths and disconnected the stream-valley floor hydrologic connectivity. Result is that stream flow water depths are shallower for a given discharge and more of the water column is warmed and there is a loss of groundwater inputs because the water table has dropped. | **Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to water withdrawals):** Similar to Alt. 2. POTENTIAL cumulative effect to stream temperature and flow remains BUT cumulative effect is now restricted to period of time between July 1 and August 14 as a result of the addition of FS Fish Protection Measures (Appendix 1A). |
| Tetra Alpha Mill and Lode | Upper Granite | **Potential for a discharge (heavy metals):** POTENTIAL cumulative effect related to a discharge of heavy metals because Boulder Creek flows into Granite Creek which already has elevated levels of heavy metals from past mining activities.<br><br>**Other Water Resource Potential Impacts (Water Withdrawal)**: POTENTIAL cumulative effect on stream temperatures IF water were withdrawn from Boulder Creek because there is the potential to increase already elevated stream temperature and that increase would overlap in time AND space the increase in stream temperatures related to past activities and a reasonably foreseeable future activity (water withdrawal from Boulder Creek by Tetra Alpha). These past activities (logging, mining, grazing, road building) have increased channel widths and depths and disconnected the stream-valley floor hydrologic connectivity. Result is that stream flow water depths are shallower for a given discharge and more of the water column is warmed and there is a loss of groundwater inputs because the water table has dropped. | **Potential for a discharge (heavy metals)**: Different than Alt 2. Under Alt 3 there would be NO cumulative effects related to heavy metals because the addition of FS General Requirements L1-L12 would eliminate the potential discharge of heavy metals into Boulder Creek and increase heavy metal concentrations in Granite Creek.<br><br>**Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to water withdrawals):** Similar to Alt. 2. POTENTIAL cumulative effect to stream temperature and flow remains BUT cumulative effect is now restricted to period of time between July 1 and August 14 as a result of the addition of FS Fish Protection Measures (Appendix 1A). |

| Plan | SWS Name | Cumulative Effects | |
|---|---|---|---|
| | | **Alternative 2** | **Alternative 3** |
| Troy D | Lower Granite | **Potential for a discharge**: NO cumulative effects despite the potential for a discharge of fine sediment from use of the settling pond because the closest Plan on Granite Creek which also has the potential for a discharge of sediment is Little Cross, which is located about 1/2 mile downstream. The potential alteration of water clarity from a discharge of sediment from Troy D would not be visible this far downstream given the small amount of sediment discharged and the volume of flow in Granite Creek. Therefore, NO overlap in time and space of direct effects. | **Potential for a discharge**: Same as Alt 2. NO cumulative effects. |
| Yellow Gold | Upper Granite | **Potential for a discharge**: NO cumulative effect despite the potential input of sediment because the sediment would be trapped in the in-channel pond in Last Chance Creek and therefore there would be no overlap in time AND space of the direct/indirect effects from any other activities occurring in the area.<br><br>**Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to water withdrawals)**: NO cumulative effect on stream flows or water temperatures because 1) Last Chance Creek is now a series of ponds and 2) the amount of water proposed for withdrawal is much less than the amount in the ponds. Therefore, there would be no measureable decrease in pond volume. | **Potential for a discharge:** Same as Alt 2. NO cumulative effects.<br><br>**Other Water Resource Potential Impacts (Stream temperature and stream flow alteration related to water withdrawals):** Same as Alt 2. NO cumulative effects |
| Yellow Jacket | Beaver | **Suction Dredging:** NO cumulative effects to water resources despite local changes in pool frequency and channel substrate because the direct effects of suction dredging would not overlap in time and space changes in pool frequency and channel substrate elsewhere in Orofino Gulch. | **Suction Dredging**: Same as Alt 2. NO cumulative effects |

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